GLOBALIZATION ACCOUNTING

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Preliminary

Abstract

This paper studies the nature of globalization and its effects on the US trade deficit. We build a quantitative model of international trade and financial integration that features time-varying frictions in the movement of goods and capital. By matching the observed volumes of trade and *gross* capital flows, the model allows us to identify the joint evolution of these two frictions. In a series of counterfactual experiments, we find that the reduction in trade costs is a prerequisite for trade and financial globalization and increases the trade deficit. On the other hand, financial integration can widen or reduce the trade deficit and the shocks affecting it have persistent effects, while shocks to trade costs are more short-lived.

Keywords: Globalization, trade, capital flows, financial frictions.

JEL Classification Numbers: F15, F36, F41

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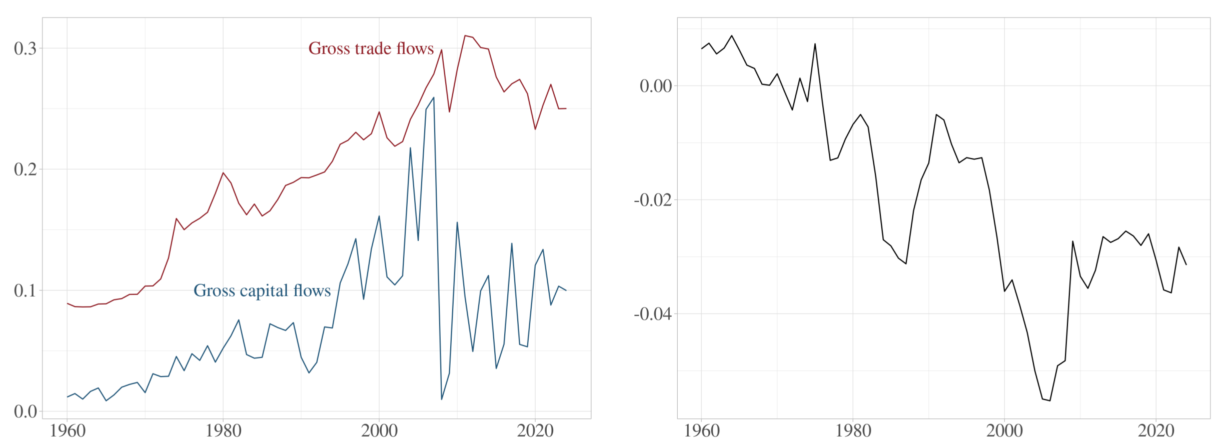
1 Introduction

Globalization has been a recurring phenomenon in the course of history, with multiple expansions and recessions going back to the ancient times. In no other period, however, has globalization reshaped the world economy as much as in the second half of the 20th century. Figure 1(a) shows that the volume of gross trade flows in the US increased 3-fold from 1960 until 2008, powered by the progress in shipping technologies and trade openness. In tandem with this trend, however, went *financial* globalization, with gross capital flows increasing by over 20-fold in the half century until 2007. As much as rising trade requires larger payments to cross national borders, so too does financial liberalization create new opportunities for trade. Under the hood of rising trade and capital flow volumes, individual economies also accumulated significant imbalances in net exports and current account (Figure 1(b)), raising concerns about a risk of financial crises or political instability. In this paper, we develop a quantitative framework to uncover the drivers of globalization and their impact on trade imbalances.



(a) Gross trade and capital flows to GDP

(b) Net exports to GDP

Figure 1: Trade and capital flows for the United States

We build a model of international trade and financial integration to study the joint dynamics and effects of trade costs and financial frictions. We use the observed series of gross trade and capital flows (as depicted in Figure 1) to identify the evolution of the two frictions in our model. The model is also designed to match the trade balance of the US which allows us to shed some light on the sources of rising imbalances in the world economy. Through a series of counterfactual experiments, we find that the reduction in trade costs is a primary driver of the increase in trade volume and a necessary prerequisite for financial globalization. Lower trade costs also influence the US trade deficit by expanding it. On the other hand, financial liberalization can act in both directions and tends to have long-lasting effects, by affecting the accumulation of wealth, while the impact of trade cost shocks is more short-lived.

Our model features two countries, two tradable goods, and two risk-free bonds denominated in each country's currencies, subject to international trade and financial frictions. The standard risk sharing motive induces households to trade goods and bonds internationally because they would like to smooth out their consumption in the face of uncertain output. The key innovation in this paper is to introduce *gross* capital flows to a model of international trade and map them directly to their data counterparts. The gross positions are determined as households choose to simultaneously invest in foreign bonds (save) and issue domestic bonds (borrow). These gross positions provide a cross-border risk sharing mechanism because of endogenous movements in the real exchange rate that correlate the households' net wealth with their (net) import demand. In other words, households are rewarded with high returns on these gross positions precisely when they have high import demand.

To see how the gross trade flows and financial positions are intertwined via the risk sharing mechanism in the model, consider two extreme cases: zero goods trading and financial autarky. If trade costs are high then no goods are traded internationally (static effect) then international bonds are of no use as well because there are no imports to finance (dynamic link). On the other hand, in the case of financial autarky households can still trade goods across the border but no bonds are traded internationally (static effect). However, the lack of risk sharing eventually feeds back to aggregate trade volumes as fewer bond redemptions imply less imports (dynamic link). This inherent dynamic interaction makes it important to consider the joint evolution of trade costs and financial frictions in determining the households' optimal decision. As trade globalization unfolds, households increase the value of cross-border bond positions to acquire an adequate degree of hedging, leading to financial globalization. Similarly, with lower barriers to cross-border financial transactions, we observe a potentially larger quantity of goods traded and less volatile consumption over time. Ultimately, it is the goal of the quantitative implementation of our model to identify the joint evolution of these underlying frictions over time by matching the observed volumes of trade and capital flows.

We bring our model to the data by jointly targeting the series of gross trade flows, gross financial positions, and the net exports of the US from 1973 until 2024. Our quantitative method is related to the approach of Chari, Kehoe and McGrattan (2007). We specify a joint stochastic process for the evolution of trade costs and financial frictions, as well as a separate process for the foreign output (needed to match the net exports). For a given set of parameters of these processes, we solve our model and iterate over the sample periods to find the sequences of these three shocks for which our model matches the gross trade flows, the gross financial positions, and the net exports of the US *exactly*. We then reestimate the parameters of the stochastic processes and repeat this procedure iteratively to maximize the likelihood of observing the matched series. The resulting series of trade costs and financial frictions are intuitive: starting at high levels in an initially fragmented world, both frictions decline until the height of globalization around 2007. Since then, the trends reverse and the uncovered variables are affected by shocks that align well with specific historical events such as the global financial crisis or the Covid-19 pandemic.

We use our model to conduct a number of counterfactual experiments. First, we fix the trade cost only at its 1973 level and generate predictions for all endogenous variables. When trade costs do not fall, globalization as we know it does not take place. Both the gross trade volumes and the gross financial positions remain diminished throughout the sample period. On the other hand, the US trade deficit is periodically reduced and never reaches the levels from the peak of globalization. Second, we fix the financial friction only at its initial level and run the similar counterfactual. In the absence of financial liberalization, the expansion in goods trade still occurs thanks to the decline in trade costs, while gross financial positions remain low. While not affecting the total volume of trade, the lack of financial integration has opposing effects on export and imports leading to a reduction in the US trade deficit that resembles a parallel shift. Through additional exercises, we also find that even temporary shocks to financial integration tend to have persistent effects, while the shocks to trade costs tend to last for a shorter time.

Finally, we use our model to conduct scenario-simulation exercises for the effects of the trade war, capital controls, and deglobalization. Specifically, we translate the "Liberation Day" tariffs imposed by the second Trump administration in April 2025 (trade war) and income taxes on foreigners' US investments proposed by the "One Big Beautiful Bill" in May 2025 (capital controls) into a shock to one of the frictions in our model. In our interpretation, by imposing a 10% baseline tariff and varying degrees of "reciprocal" tariffs, the trade war would correspond to a hike in trade costs. On the other hand, the capital control measures proposed in the new tax bill Section 899 would materialize as an increase in cross-border financial frictions. Finally, we experiment with scenarios where either the trade war or capital controls occur at the dawn of deglobalization which leads both wedges to trend upwards. We simulate our model forward to generate the predictions for the future of globalization and the US trade deficit under each scenario. While we find that the trade war may accelerate the reduction in the trade deficit temporarily, its marginal effect is small and short-lived. The deglobalization scenario, and ultimately a mean reversion in the fundamental factors driving the imbalances, prove to be the most powerful force that reduces the trade deficit compared to either trade war or capital controls.

Literature Review This paper contributes to the growing literature on international trade and financial integration, and global imbalances. Mendoza, Quadrini, and Rios-Rull (2009) argue that imbalances can arise with financial integration under improved financial development. Bai and Zhang (2012) point out that financial liberalization need not lead to improved risk sharing if contracts cannot be easily enforced. Hu (2023) investigates asset allocation in a DSGE model with trade and financial linkages across many countries. She finds that asset portfolios are heavily influenced by financial frictions. However, as shown by Fitzgerald (2012), both frictions in international asset markets and trade costs significantly impede optimal consumption risk sharing. As a result, recent literature has shown the impact of trade costs on trade deficits and net financial positions. For instance, Reyes-Heroles (2016) uses a quantitative multi-country trade model in which trade imbalances arise endogenously to shows that the decline in trade costs over time has resulted in larger trade imbalances. Sposi (2022) argues that demographic structure is important in accounting for countries' trade and capital flows. Kleinman, Liu, Redding, and Yogo (2025) add trade and capital market frictions to otherwise standard neoclassical growth model and compute its transition to the steady state. Waugh and Ravikumar (2016) identify the unobserved trade frictions by measuring the countries' openness in a multicountry trade model. We add to this literature by incorporating gross financial flows and financial frictions.

Additionally, this paper contributes to the literature on the impact of financial frictions on gross and net trade. Manova (2013) shows theoretically and empirically that domestic financial friction can have significant impact on the volume of trade. Our paper focuses on international instead of domestic financial frictions, and investigates the impact of such frictions on trade. Recent literature on this topic includes Alessandria, Bai and Woo (2024). Using a multi-country model with business cycle shocks, trade barriers and financial frictions, the authors find that a reduction in financial frictions impacts the volatility of net capital flows but not gross trade and financial flows. In comparison, our model incorporates domestic and foreign denominated assets instead of a single bond. Finally, as in Itskhoki and Mukhin (2021), we study the role of financial frictions and endogenous exchange rates, with a focus on their interaction with gross trade and trade balance.

The mechanism by which gross positions arise endogenously in our model closely follows Lee (2024). She develops a theory in which gross capital flows are driven by financial frictions and risk-sharing. We build on this work by incorporating trade cost shocks.

In addition to the above mentioned additions to the existing literature, our paper has a methodological contribution to the business cycle accounting literature. Pioneered by Chari, Kehoe and McGrattan (2007), qualitative models are utilized to back out unobserved time-varying wedges by exactly matching observed data. This approach has been applied to study international trade or financial flows separately. For instance, Atkeson, Heathcote and Perri (2024) investigate the drivers behind changes in US net assets by matching flows, stocks, and valuation of the US corporate sector but in a model without goods trade. Capelle and Pellegrino (2025) use a wedge accounting procedure in a spatial general equilibrium model to measure the heterogeneity in the patterns of financial globalization across countries. Jung (2020) utilizes a multi-country trade model with time-varying trade and financial frictions where the trade barriers are backed out to match trade flows but financial frictions are endogenously calibrated. Our paper backs out time-varying international trade and financial frictions simultaneously by exactly matching observed gross trade and capital flows.

Our model incorporates demand shock following the recent literature, especially in explaining the large and persistent current account deficit in the United States. Kehoe, Ruhl, and Steinberg (2018) introduces the saving glut, which is an increased demand for saving by the rest of the world, in addition to the structural change to explain the US trade balance. Our demand shocks are positively correlated with output shocks, in line with the recent paper by Bai, Rios-Rull, and Storesletten (2024) who provide a theory of demand shocks that have a productive role.

2 Model

In this section, we introduce our modeling framework. We first present the model of international trade and capital flows that largely builds on Lee (2024). Next, we strip the model down to a two-period version to establish some basic intuition for the two key mechanisms that we will use to identify the underlying frictions in trade and financial integration. Finally, we pose the infinite horizon model in a recursive form as we describe our solution method.

2.1 Physical environment

Time is discrete and goes up to infinity. In each time period, an exogenous vector of state variables $s_t \in S$ is realized following a Markov process described in the next subsection. Hence, the probability of a particular s_t draw depends only on its realization in the previous period (s_{t-1}), and the probability of such a transition is denoted as $\pi(s_t|s_{t-1})$.

The world consists of two countries, each populated by a continuum of identical households with measure 1 and endowed with a stream of uncertain realizations of its tradable good. For clarity, we will use Roman numerals (in superscript) to refer to the countries and I and II, and we will use letters b and m (in subscript) to refer to the goods produced in the two countries, respectively. For simplicity, the goods can be thought of as **b**ananas and **m**angoes, and their stochastic yields will be denoted as (y_b, y_m). Assuming that the law of one price holds for tradable goods, their market prices are denoted as (p_b, p_m).

Each country can issue and trade one-period risk-free bonds which represent a claim on an amount of their own final good. The investment positions of country i in the two bonds are denoted as (a^i_b, a^i_m) and the bond prices are (q_b, q_m).

Frictions There are time-varying frictions in the international trade of goods and financial assets. First, we assume an iceberg cost for shipping goods internationally where a fraction τ_t of the good melts down before it arrives. There is also a friction in trading bonds which can be though of as capital controls. Specifically, a household must pay a tax (or receive a subsidy) κ_t of the value of foreign bonds traded. The tax revenue collected is then rebated to each household in the form of a lump-sum payment.

Household's problem Each representative household is risk averse and demands a basket of bananas and mangoes. It has a recursive preference (Epstein and Zin, 1989) over the total consumption basket with the risk aversion parameter γ, intertemporal elasticity of substitution ψ, and a discount factor $\beta < 1$. For the case of country I, the household's preference is

$$v_t^I = \left((1-\beta)\theta_t^I (c_t^I)^{1-1/\psi} + \beta \mathbb{E}_t \left[(v_{t+1}^I)^{1-\gamma} \right]^{\frac{1-1/\psi}{1-\gamma}} \right)^{\frac{1}{1-1/\psi}} \tag{1}$$

where θ_t^I is a taste shock that is assumed to be perfectly correlated with the domestic endowment as a form of power function, $\theta_t^I = y_b^2$. The final consumption good in country I, c_t^I, is a CES aggregate with an elasticity of substitution σ and home bias $\omega_b^I > 1/2$:

$$c_t^I = \left((\omega_b^I)^{\frac{1}{\sigma}} (c_{b,t}^I)^{\frac{\sigma-1}{\sigma}} + (\omega_m^I)^{\frac{1}{\sigma}} (c_{m,t}^I)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{2}$$

The household chooses investment positions $\{a_{b,t+1}^I, a_{m,t+1}^I\}$ and consumption amounts $\{c_{b,t}^I, c_{m,t}^I\}$ to maximize its lifetime utility subject to the following budget constraint for each time period t:

$$\begin{aligned} p_{b,t} c_{b,t}^I + \frac{e_t p_{m,t}}{1-\tau_t} c_{m,t}^I + a_{b,t+1}^I q_{b,t} + \Big(1 + \kappa_t \cdot sign(a_{m,t+1}^I)\Big) e_t a_{m,t+1}^I q_{m,t} = \\ p_{b,t} y_{b,t} + a_{b,t}^I + e_t a_{m,t}^I + T_t^I \end{aligned} \tag{3}$$

In equation (3), e_t is the real exchange rate defined as the price of country 2 final good in units of country 1 final good. The lump-sum transfer T^I is equal to the tax revenue (or subsidy) on foreign bond transactions:

$$T_t^I = \kappa_t \cdot sign(a_{m,t+1}^I) e_t a_{m,t+1}^I q_{m,t}. \tag{4}$$

The household faces a borrowing constraint imposed on the total amount of debt:

$$a_{b,t+1}^I \mathbb{1}_{\{a_{b,t+1}^I < 0\}} + e_t a_{m,t+1}^I \mathbb{1}_{\{a_{m,t+1}^I < 0\}} \geq \bar{A}^I. \tag{5}$$

In the quantitative analysis, these borrowing constraints are calibrated so that they do not bind in equilibrium. The problem of the household in country II is symmetric. Finally, price indices are defined as a standard CES price aggregator:

$$1 = \left(\omega_b^I (p_{b,t})^{1-\sigma} + \omega_m^I \left(\frac{e_t \, p_{m,t}}{1-\tau_t}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \tag{6}$$

$$1 = \left(\omega_b^{II} \left(\frac{p_{b,t}}{e_t(1-\tau_t)}\right)^{1-\sigma} + \omega_m^{II} (p_{m,t})^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \tag{7}$$

Market clearing In each period, all goods and financial asset markets must clear. In other words, the total yield of each good is equal to the domestic consumption of that goods and the exported amount, while there is zero net supply for each bond. The following are the four market clearing conditions:

$$y_{b,t} = c_{b,t}^I + \frac{c_{b,t}^{II}}{1-\tau_t} \tag{8}$$

$$y_{m,t} = \frac{c_{m,t}^I}{1-\tau_t} + c_{m,t}^{II} \tag{9}$$

$$0 = a_{b,t+1}^I + a_{b,t+1}^{II} \tag{10}$$

$$0 = a_{m,t+1}^I + a_{m,t+1}^{II} \tag{11}$$

2.2 Two Period Model

Before proceeding to the full quantitative results, we first strip our main model down to a simplified two-period version in order to present the key intuition. Consider the environment described in Section 2.1 with two periods only, indexed $t = 1, 2$. In period $t = 1$, goods endowments are pre-determined. The only source of uncertainty comes from stochastic realizations of the two goods in period $t = 2$ (which also determine the countries' demand shocks). The financial friction in the first period and the trade cost in the second period are assumed to be fixed (for simplicity there are no trade costs in $t = 1$). Each country starts with zero initial positions in period $t = 1$, and each country must choose zero positions in period $t = 2$; hence the only active investment choice occurs in the first period. We also assume that risk aversion is equal to an inverse of the intertemporal elasticity of substitution ($\gamma = 1/\psi$), which makes the preference equal to a time-separable Constant Relative Risk Aversion (CRRA) utility. This is a special case of the recursive preferences we use in our main analysis of the infinite horizon framework. To characterize this simplified variant of the model, we work the problem out backwards.

Second period In period $t = 2$, the representative agent in country I solves the following problem (the problem for the agent in country II is analogous):

$$\max_{c^I_{b,2}, c^I_{m,2}} \; \theta^I_2 \, u(c^I_2)$$

$$s.t. \;\; p_{b,2} c^I_{b,2} + \frac{e_2 p_{m,2}}{1-\tau} c^I_{m,2} = p_{b,2} y_{b,2} + a^I_{b,2} + e_2 a^I_{m,2} \tag{12}$$

First period In period $t = 1$, the representative agent in country I solves the following problem

$$\max_{c^I_{b,1}, c^I_{m,1}, a^I_{b,2}, a^I_{m,2}} \; u(c^I_1) + \beta \mathbb{E} \, \theta^I_2 u(c^I_2)$$

$$s.t. \;\; p_{b,1} c^I_{b,1} + e_1 p_{m,1} c^I_{m,1} + a^I_{b,2} q_b + \Big(1 + \kappa \cdot sign(a^I_{m,2})\Big) e_1 a^I_{m,2} q_m = p_{b,1} y_1 + T^I_1 \tag{13}$$

$$p_{b,2} c^I_{b,2} + \frac{e_2 p_{m,2}}{1-\tau} c^I_{m,2} = p_{b,2} y_{b,2} + a^I_{b,2} + e_2 a^I_{m,2} \tag{14}$$

Analysis Notice that our assumptions for this model variant imply that the two countries are perfectly symmetric in period $t = 1$. Hence, by bond market clearing conditions (10)-(11), the countries must choose symmetric positions $a^I_{m,2} = -a^I_{b,2} \equiv a^I$, which further implies that the bond prices are symmetric, $q_b = q_m \equiv q$, and the real exchange rate in that period is $e_1 = 1$. To build further intuition, we can use this characterization to further simplify the budget constraints as follows

$$p_{b,1} c^I_{b,1} + p_{m,1} c^I_{m,1} - a^I q + \Big(1 + \kappa \cdot sign(a^I)\Big) a^I q = p_{b,1} y_1 + T^I_1 \tag{15}$$

$$p_{b,2} c^I_{b,2} + \frac{e_2 p_{m,2}}{1-\tau} c^I_{m,2} = p_{b,2} y_{b,2} + a^I (e_2 - 1) \tag{16}$$

Equation (16) reveals an important insight. The agent's *net wealth* in period $t = 2$, which automatically determines the country's *net imports*, is given by the product of the gross foreign position a^I and the real exchange rate in that period. We can rewrite this identity as follows

$$a^I = \frac{\text{net imports}}{e_2 - 1} = \frac{\frac{e_2 p_{m,2}}{1-\tau} c^I_{m,2} - p_{b,2}(y_{b,2} - c^I_{b,2})}{e_2 - 1} \tag{17}$$

To insure against the uncertainty in the second period, the country's optimal gross foreign position is such that they build sufficient wealth to afford the desired net imports, adjusted for the endogenous movement of the real exchange rate. This insight is important to understand the signs of the optimal gross positions in the model equilibrium.

2.2.1 Mechanism 1: dynamic interactions of τ and κ

The first key mechanism of our model shows how we can use the observed data on gross trade flows and gross financial positions to jointly identify the underlying trade and capital market frictions. This mechanism is illustrated in Figure 2. In the left-hand side panel, a higher iceberg trade cost parameter τ leads to lower gross trade volumes in period $t = 2$. Similarly, in the right-hand side panel, a higher capital control parameter κ leads to reduced gross financial positions in period $t = 1$. These results are intuitive and reveal the *static effects* of trade costs and financial frictions. Because the two frictions make goods and asset trading more expensive, agents do less of it.

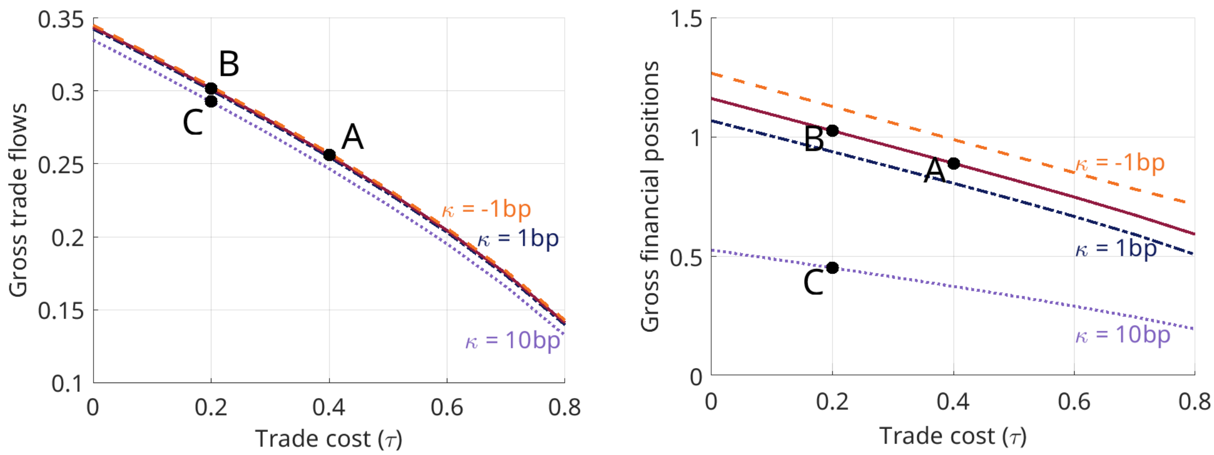


Figure 2: Gross trade flows and gross financial positions in the simplified model

Figure 2 also reveals the *dynamic interaction* between the two frictions. In the left-hand side panel, a higher capital control parameter in period $t = 1$ reduces future gross trade flows for any value of τ, while in the right-hand side panel, a higher trade cost parameter in period $t = 2$ reduces the initial gross financial positions for any value of κ. This interaction materializes because, on the one hand, higher trade costs impede the benefit from risk sharing as it is more costly to execute the trades required to settle their respective claims. On the other hand, higher financial frictions discourage the two countries from exchanging claims which leads to a lower volume of goods traded next period due to fewer bond redemptions.

The dynamic interaction between τ and κ is precisely the reason why their values can only be identified jointly from the observed volumes of trade and capital flows. Figure 2 also shows an example of how the two frictions are identified when the observed series go in opposite direction. Suppose we start from point A, with $\tau = 0.4$ and $\kappa = 0$, where the gross trade flows are about 0.25 and gross positions are 0.9. If the observed trade flows increased, matching them would entail a reduction in τ to about 0.2 (point B). However, a simultaneous decrease in the gross positions would require hiking κ to 10 basis points along with a slight downward adjustment to τ. Eventually we land at point C with higher trade flows and lower gross positions.

Finally, we consider whether the identification is unique. While we do not provide an analytical proof, we conduct a series of numerical tests which suggest that it is. The key insight lies in the heterogeneous responsiveness of gross trade flows and gross positions to trade costs (τ) and financial frictions (κ). Formally, we find that the Jacobian of the mapping from (τ, κ) to the observables has a strictly nonzero determinant throughout the relevant state space. By the inverse function theorem, this implies the existence of a local inverse: each observed combination of gross trade flows and gross positions corresponds to a unique pair (τ, κ). Intuitively, as long as the sensitivity of each function to τ and κ differs sufficiently, no alternative pair can replicate the same observables.

2.2.2 Mechanism 2: determination of gross positions

We now turn to our second key mechanism which determines the sign and magnitude of the gross financial positions. Let the demand shock country i receives take the form $\theta^i = y_{i,2}^{\alpha}$, i.e. it is correlated with the country's endowment realization with a power parameter α. Figure 3 shows that for low values of α (in particular, when it is zero), low realizations of domestic endowment lead to an appreciation of the real exchange rate (because domestic good is scarce and its relative price increases). Furthermore, because the two goods are assumed to be gross substitutes ($\sigma\gamma > 1$), a low endowment realization leads to positive net imports due to the substitution effect. Following the gross position characterization in formula (17), it then follows that the country optimally chooses its foreign bond holdings to be *negative*. In other words, each country will save in domestic bonds and borrow in foreign bonds.

Now, suppose that the power parameter α takes a high enough value, for example 2 as in Figure 3. By analogous logic, a low realization of domestic endowment still leads to an appreciation of the exchange rate. However, this realization is now correlated with a low demand shock. As a result, rather than being a net importer, the country exports more of its own good than it imports the foreign one. With both net imports and $e_2 - 1$ turning negative, the country will now choose a *positive* foreign bond holding by the logic of formula (17). In other words, each country will borrow in domestic bonds and simul-

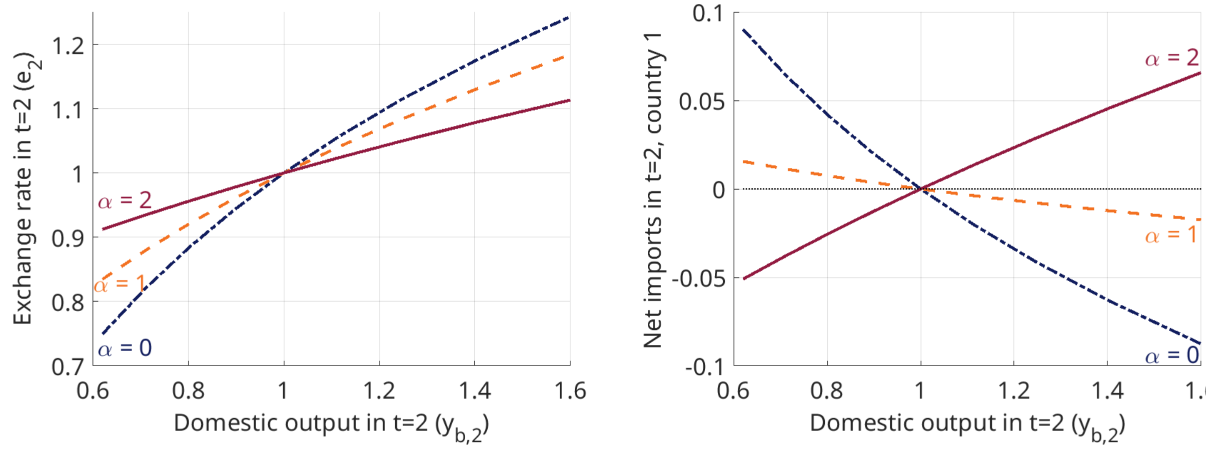


Figure 3: Determinants of optimal gross foreign position in the simplified model

taneously save in foreign bonds.

These results are further summarized in Figure 4 which plots the optimal foreign bond position a as function of the demand shock power parameter α. For low values, the optimal position is negative which implies borrowing in foreign bonds. For the power parameter above the value of around 1.2, the optimal position turns positive which implies saving in foreign bonds.

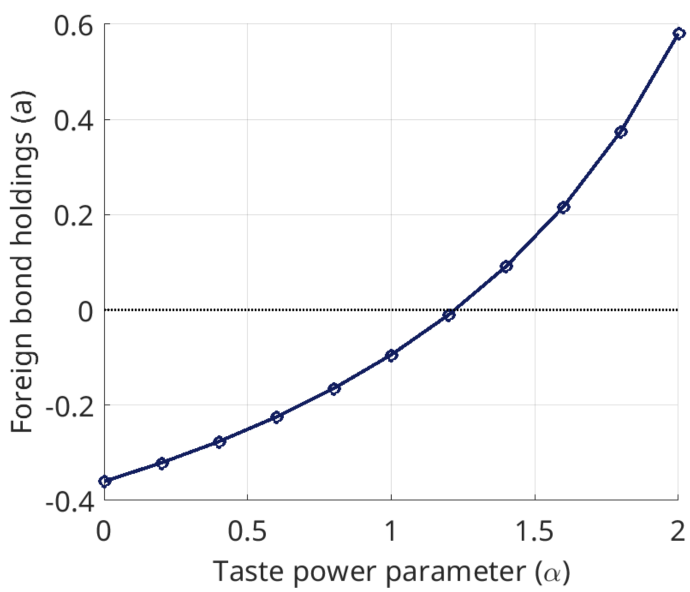


Figure 4: Optimal foreign bond holding in the simplified model

Which of these two cases is more relevant empirically? Figure 5 plots the share of assets and liabilities of the United States denominated in its own currency (USD) over time. It is immediate to notice that over 80% of US liabilities are denominated in the dollar, and this share is stable over time. On the other hand, historically less than half of US assets are denominated in USD and the share has been falling, recently dropping to as low as 30%. With this mechanism and the evidence in hand, we will next calibrate our main infinite horizon model to feature a negative domestic gross position, and a positive foreign gross position with a sufficiently high value of demand shock power parameter α.

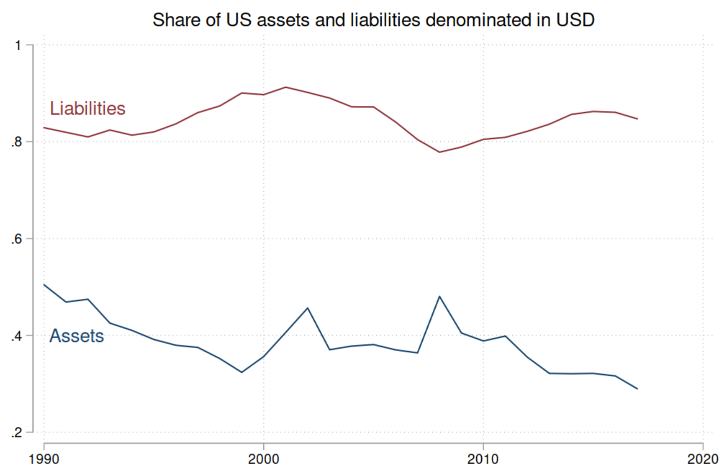


Figure 5: Share of US assets and liabilities denominated in USD

2.2.3 The hedging benefits of two bonds

The main motive for holding gross positions in our model is for both countries to insure against uncertain endowment realizations. In this section we use the simplified model to show that this is indeed the case. The left-hand side panel of Figure 6 plots a representative agent's lifetime utility in period $t = 1$ relative to the financial autarky benchmark, for different values of τ. Under financial autarky (normalized to zero), no financial asset trading is allowed and countries attain a balanced trade in the second period. The solid line at the top shows the extra utility in a social planner's solution, while the dashed line shows the utility in our model. As is evident, the availability of two bonds indeed allows each country to reap most of the hedging benefits of the first-best arrangement. The right-hand side panel plots the expected (from the perspective of period 1) exports-to-GDP. This shows that our model generates most of the variation in the trade flows that would materialize under an optimal insurance arrangement.

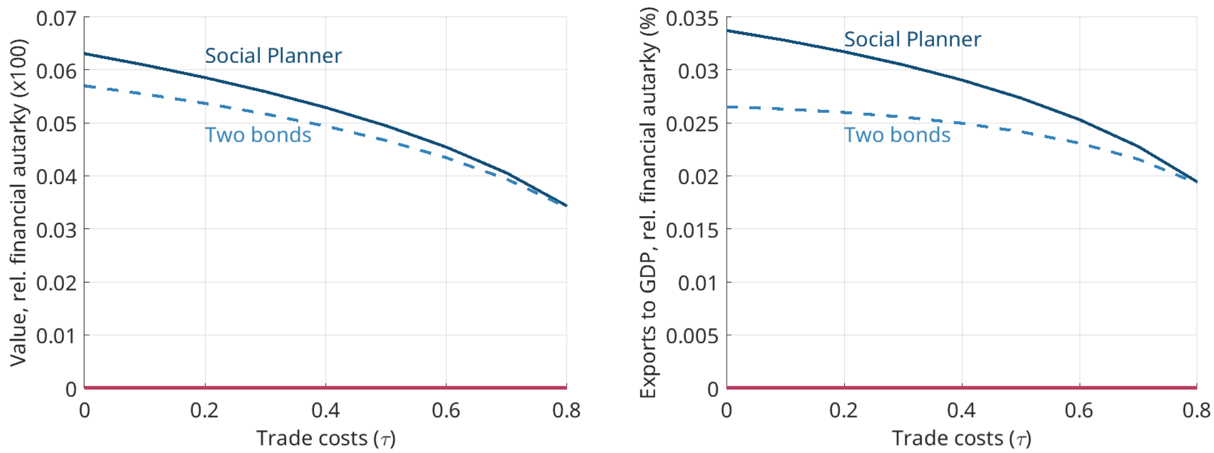


Figure 6: The two-bond model against benchmarks

It is noteworthy that in the two-period model, one-bond economy is equivalent to the financial autarky case in equilibrium. Specifically, if only one of the bonds were allowed instead of two bonds, then the equilibrium bond holdings would be zero in the first period due to the perfect symmetry. This results in a balanced trade in the second period for any state. In other words, non-zero gross asset positions arise only in the two-bonds setting, allowing agents to leverage the endogenous exchange rates that are state-contingent and bring the values closer to those of a Social Planner. Therefore, Figure 6 highlights the role of gross positions in risk sharing in contrast to the one-bond environment.

2.3 Recursive formulation

Exogenous states There are five exogenous states in this economy, which can be divided into two groups. The first set is output shocks for each country, $y_t = (y_{b,t}, y_{m,t})$, which follow a joint log normal AR1 process:

$$\log y_t = \rho_y \log y_{t-1} + \varepsilon_t \tag{18}$$

where $\varepsilon_t = (\varepsilon_{b,t}, \varepsilon_{m,t}) \sim \mathcal{N}(0, \Sigma_y)$, *i.i.d.*

The second group consists of a binary regime variable $\xi_t = \{\xi_H, \xi_L\}$ that follows Markov chain, and trade costs (τ_t) and financial frictions (κ_t) that follow a joint regime-switching AR1 process. We assume that there are two regimes — the "High" (Fragmentation) regime (ξ_H) represents the economy where trade and financial frictions are high, whereas the "Low" (Globalization) regime (ξ_L) resembles globalization with low trade and financial frictions. The regime can switch following a Markov chain process, and each regime dictates the mean of trade and financial frictions $\mu(\xi) = (\mu_\tau(\xi), \mu_\kappa(\xi))$. In order to ensure that trade costs are contained between 0 and 1 while corresponding shocks are unbounded, we impose a functional form such that $\tau_t = exp(-exp(\tilde{\tau}_t))$ and $\tilde{\tau}_t$ follows a regime-switching log normal AR1 process. We allow financial frictions κ_t to be negative by assuming a regime-switching AR1 process on κ_t itself. Formally,

$$\tilde{\tau}_t = (1-\rho_\tau)\mu_\tau(\xi_t) + \rho_\tau \tilde{\tau}_{t-1} + v_{\tau,t} \tag{19}$$

$$\kappa_t = (1-\rho_\kappa)\mu_\kappa(\xi_t) + \rho_\kappa \kappa_{t-1} + v_{\kappa,t} \tag{20}$$

where $v_t = (v_{\tau,t}, v_{\kappa,t}) \sim \mathcal{N}(0, \Sigma_{\tau\kappa})$, *i.i.d.*

In the following, we denote the entire set of exogenous states as $s_t = (y_{b,t}, y_{m,t}, \xi_t, \tau_t, \kappa_t)$.

Net wealth: single endogenous state For an individual household i in country I, the (normalized) net wealth $w(i, s_t)$ is defined as the total cash-in-hand over the world output:

$$w(i, s_t) = \frac{p_b(s_t)y_b(s_t) + a_b^I(s_t) + e(s_t)a_m^I(s_t)}{p_b(s_t)y_b(s_t) + e(s_t)p_m(s_t)y_m(s_t)} \tag{21}$$

All households are symmetric within each country. By aggregating up the individuals, we get the single endogenous state W:

$$W(s_t) = \int_{i\in[0,1]} w(i, s_t)di \tag{22}$$

In other words, the endogenous state is the country I's net wealth plus its output over the total world GDP. Notice that when two countries are perfectly symmetric, the "ergodic steady state" of the net wealth will be 1/2. Also, due to the zero net supply of bonds, country I's net wealth is a sufficient statistic for the entire world.

Evolution of net wealth Each individual household forms rational expectations about the evolution of aggregate net wealth. Given the current state s_t, there is a mapping Γ from any pair of the current net wealth and future state, $(W(s_t), s_{t+1})$, to the future net wealth $W(s_{t+1})$:

$$W(s_{t+1}) = \Gamma\left(W(s_t), s_{t+1}; s_t\right) \tag{23}$$

Combining the rational expectations about the evolution of aggregate net wealth and the definition of individual net wealth, the following should hold in equilibrium for any pair of states (s_{t+1}, s_t), given the equilibrium policy functions:

$$W(s_{t+1}) = \frac{p_b\left(W(s_{t+1}), s_{t+1}\right) y_b(s_{t+1}) + a_b^I\left(W(s_t), s_t\right) + e\left(W(s_{t+1}), s_{t+1}\right) a_m^I\left(W(s_t), s_t\right)}{p_b\left(W(s_{t+1}), s_{t+1}\right) y_b(s_{t+1}) + e\left(W(s_{t+1}), s_{t+1}\right) p_m\left(W(s_{t+1}), s_{t+1}\right) y_m(s_{t+1})} \tag{24}$$

Also, in equilibrium, individual net wealth is equal to the aggregate net wealth by symmetry: $w(i, s_t) = W(s_t),\ \forall (i, s_t)$.

Recursive form of HH problem in country I Formally, a recursive form of the household I's problem is:

$$V^I(w; W, s) = \max_{c^I, a_b^I, a_m^I} \left((1-\beta)\theta^I(s)(c^I)^{1-1/\psi} + \beta \sum_{s'} \pi(s'|s) \left[\left(V^I(w'; W', s') \right)^{1-\gamma} \right]^{\frac{1-1/\psi}{1-\gamma}} \right)^{\frac{1}{1-1/\psi}} \tag{25}$$

$$\begin{aligned}
s.t.\ c^I + q_b(W,s)a_b^I + \left(1 + \kappa(s) \cdot sign(a_m^I)\right) e(W,s) q_m(W,s) a_m^I& \\
= w \cdot [p_b(W,s)y_b(s) + e(W,s)p_m(W,s)y_m(s)] + T(W,s)& \quad (26)\\
a_b^I \mathbb{1}_{\{a_b^I < 0\}} + e(W,s) a_m^I \mathbb{1}_{\{a_m^I < 0\}} \geq \bar{A}^I& \quad (27)\\
W' = \Gamma(W, s'; s)& \quad (28)\\
w' = \frac{p_b(W',s')y_b(s') + a_b^I + e(W',s')a_m^I}{p_b(W',s')y_b(s') + e(W',s')p_m(W',s')y_m(s')}& \quad (29)
\end{aligned}$$

and country II is symmetric.

2.4 Solution

We solve for the policy functions globally, allowing for non-linear policy functions over a wide range of exogenous shock realizations. We start with an initial guess of policy functions and prices, update them by solving for a system of non-linear equations, and iterate until convergence.

Formally, we denote a set of endogenous state, policy functions, prices, and borrowing constraint slackness conditions (following Garcia-Zangwill 1981) in the k-th iteration as

$$\Omega(k) = \{W(k), c_b^I(k), c_m^I(k), a_b^I(k), a_m^I(k), p_m^I(k), p_b^I(k), e(k), q_b(k), q_m(k), \alpha^I(k), \alpha^{II}(k)\}.$$

Also, define a subset of Ω that excludes the endogenous variable W as $\tilde{\Omega}(k) = \Omega(k)/W(k)$.

This subset contains policy functions and prices that are functions of endogenous variable W and exogenous state s. The solution follows the steps described below. For brevity, the endogenous and exogenous states (W, s) are suppressed in the following steps.

1. Set up the initial guess of $\tilde{\Omega}(0)$ and the grid of endogenous variable W.

2. Solve for the system of equations by setting $\tilde{\Omega}(k)$ as the initial guess.

3. Update $\tilde{\Omega}(k+1) = (1-\rho)\tilde{\Omega}(k) + \rho\hat{\Omega}$, where $\hat{\Omega}$ is the new set of policy functions and prices as a result of Step 2 and ρ is the update speed.

4. Stop if the maximum distance between the k-th and (k+1)-th policy functions is below the threshold. Otherwise, go back to Step 2.

System of equations For each grid of endogenous and exogenous states (W, s), we solve for the following system of non-linear equations. We suppress states for brevity.

$$\left(q_b^I - q_b^{II}\right)|a_b^I| = 0 \tag{30}$$

$$\left(q_m^I - q_m^{II}\right)|a_m^I| = 0 \tag{31}$$

$$p_b c_b^I + \frac{e p_m}{1-\tau} c_m^I + q_b a_b^I + e q_m a_m^I - W \cdot [p_b y_b + e p_m y_m] = 0 \tag{32}$$

$$\min\{a_b^I, 0\} + e * \min\{a_m^I, 0\} - \bar{A}^I - \max\{\alpha^I, 0\}^\zeta = 0 \tag{33}$$

$$\min\{-a_b^I, 0\}/e + \min\{-a_m^I, 0\} - \bar{A}^{II} - \max\{\alpha^{II}, 0\}^\zeta = 0 \tag{34}$$

The five unknowns are $\{c_b^I, a_b^I, a_m^I, \alpha^I, \alpha^{II}\}$. The system of equations are derived from the first order conditions, household I's budget constraint, and borrowing constraints for both countries. The first two equations characterize the law of one price for bond prices (q_b, q_m), conditional on the bond markets being formed. For example, the bond price for country 1 evaluated by household I, q_b^I, must be equal to that evaluated by household II, q_b^{II}, whenever there is a positive amount of holding in the market ($|a_b^I| > 0$). The third equation ensures that the budget constraint for the household I is met. Notice that by Walras's Law, household II budget constraint is also satisfied using market clearing conditions. In the last two equations for borrowing constraints, the Garcia-Zangwill parameter ζ is set to 2.

3 Quantitative Analysis

In this section, we bring the model to the data by picking some of its parameters from external sources and estimating the rest. As a crucial component, we conduct the main exercise of backing out the series of trade costs and capital controls that match the observed volume of trade and capital flows.

3.1 General approach

The core idea behind this paper is to use the information in the total volumes of gross trade and capital flows to infer the dynamics of trade costs and capital controls illustrated in Figure 1. To this end, we develop an algorithm that combines a Maximum Likelihood estimation of the parameters characterizing these stochastic processes, with an exercise that infers the paths of wedges as in Chari, Kehoe and McGrattan (2007). The main two wedges of interest, τ_t and κ_t, are complemented with the third one, $y_{m,t}$, the Rest of the World (RoW) endowment, the path of which is fitted to match the net trade balance between the two countries (in addition to the two series of gross flows which are pinned down by the first two wedges).

Algorithm Specifically, we start with a vector of initial guesses for the parameters $\{\bar{\iota}_H, \bar{\iota}_L, \rho_\iota, \sigma_\iota, \iota_0\}$ for $\iota \in \{\tau, \kappa\}$, as well as regime transition probabilities $\{p_{LH}, p_{HL}, p_0\}$. Given these parameter choices (along with an array of parameter values set externally), we solve for the policy functions of the model using a time iteration method that builds on Lee (2024). We then go over the time period 1973-2024 and for each year we back out a vector $\{\tau_t, \kappa_t, y_{m,t}\}$ such the model matches exactly the following data points:

- Gross trade flows to GDP
- Net exports to GDP
- Gross financial positions to GDP

Having backed out these series, we use a Maximum Likelihood method to update the estimates for the parameters of the stochastic processes driving them. We iterate on these parameter values until convergence.

Target Data Our main quantitative analysis is based on the United States against the Rest of the World over the time period 1973-2024. Trade and capital flows over GDP series are sourced from the International Transactions (ITA) data by the Bureau of Economic

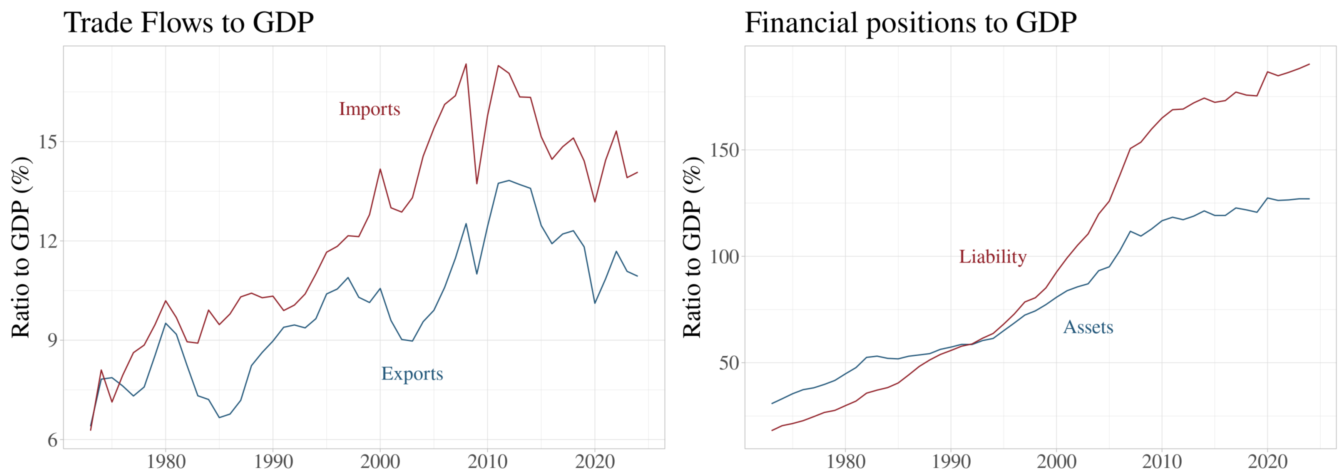


Figure 7: US data targets: trade flows and financial positions to GDP

Analysis (BEA).

Two targeted series based on trade flows are straightforward. Gross trade flows to GDP is equal to the sum of exports and imports to GDP, while the net exports to GDP is the exports net of imports to GDP.

The remaining targeted series, gross financial positions to GDP, is constructed as a cumulative sum of asset and liability flows (also known as outflows and inflows) over time. The initial level of gross positions are set in 1960, the first year of observation in the ITA data, following the figures from Gourinchas and Rey (2007). This approach focuses on the financial positions due to transactions, and does *not* include valuation effects. The reason for excluding valuation effects in designing the target data is twofold. First, in the US data, a majority of fluctuations in gross capital flows arise due to *debt* instruments such as bonds or bank loans, where valuation effects are limited compared to equities or direct investments. Second, motivated by these data observations, we abstract away from the international equity holdings and focus on the gross flows arising from bond transactions. If we include valuation effects as part of the data target, it would require adding equity transactions to the model, which would significantly complicate the model. Therefore, we leave the inclusion of valuation effects to future research.

Detrending The US GDP data we use to calibrate the model (as country I), as well as the RoW GDP that we use to compare against the model-generated one are non-stationary. We detrend them using a broken linear trend. Following the approach in Paluszynski

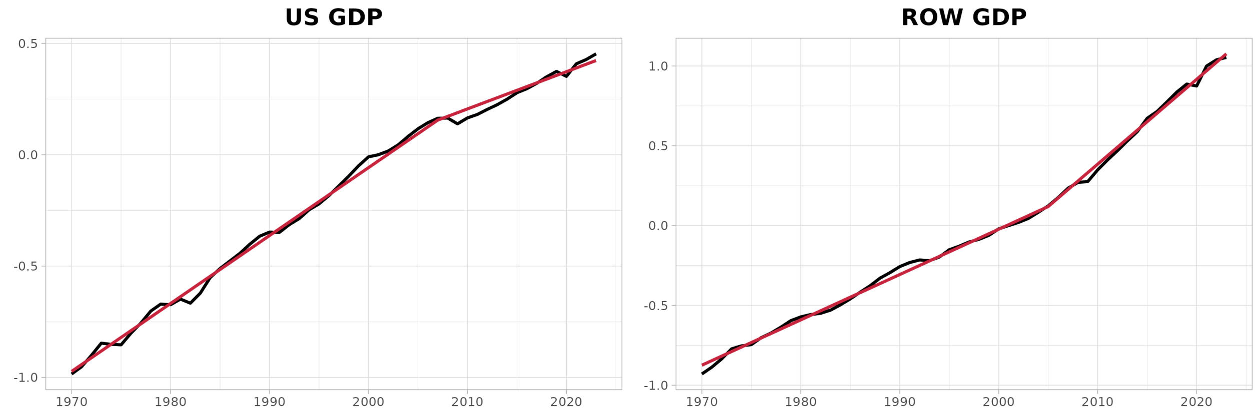


Figure 8: GDP series and their trends

(2023), we detect a statistically significant breakpoint using the Bai-Perron (Bai and Perron, 1998) test and impose continuity of the trend line. The estimated breakpoints are in years 2008 and 2006 for the case of the US and RoW, respectively. Figure 8 illustrates the obtained trend lines in both cases.

3.2 Parameterization

We parameterize the model through a combination of external calibration and maximum likelihood estimation. Table 1 summarizes the fixed parameters that we pick from outside sources. The discount factor β, the risk aversion γ, and intertemporal elasticity of substitution ψ are set to the standard values of 0.98, 10, and 0.5, respectively. The elasticity of substitution σ is set to 1.5 implying that the two goods are gross substitutes. The home bias parameters in both countries are set to 0.8 roughly following Lee (2024). Finally, the persistence and the standard deviation of innovations to the stochastic endowment in country I is estimated using the linearly detrended US real GDP data.

Table 1: Summary of externally selected parameters

Symbol	Meaning	Value	Source
β	Discount factor	0.98	Standard
γ	Risk aversion	10.00	Standard
ψ	Intertemporal elasticity of substitution	0.50	Standard
σ	Elasticity of substitution between goods	1.50	Standard
ω_b^I	Country I home bias	0.80	Literature
ω_m^{II}	Country II home bias	0.80	Literature
ρ_b	Persistence of country I income	0.70	Estimated
σ_b	Innovation to country I income	0.02	

Table 2 summarizes the results of our maximum likelihood estimation procedure. We find that trade costs τ fluctuate between the unconditional means of 0.83 and 0.57, while capital controls κ take values around the means of 89 and 81 basis points. Both processes are fairly persistent. The regime initially starts high and has a relatively low probability of switching to the low one, at 7.6%. On the other hand, the probability of switching from low back to high is essentially negligible.

Table 2: Summary of estimated parameters

Symbol	Meaning	Value
$\bar{\kappa}_H$	High regime mean κ	0.0089
$\bar{\kappa}_L$	Low regime mean κ	0.0081
ρ_κ	Persistence κ	0.7232
σ_κ	St. deviation κ	0.0002
$\bar{\tau}_H$	High regime mean τ	0.8294
$\bar{\tau}_L$	Low regime mean τ	0.5748
ρ_τ	Persistence τ	0.7946
σ_τ	St. deviation τ	0.3135
p_{LH}	Regime transition L to H	0.0005
p_{HL}	Regime transition H to L	0.0762
κ_0	Initial κ	0.0071
τ_0	Initial τ	0.9512
p_0	Initial high regime prob.	1.0000

3.3 Results

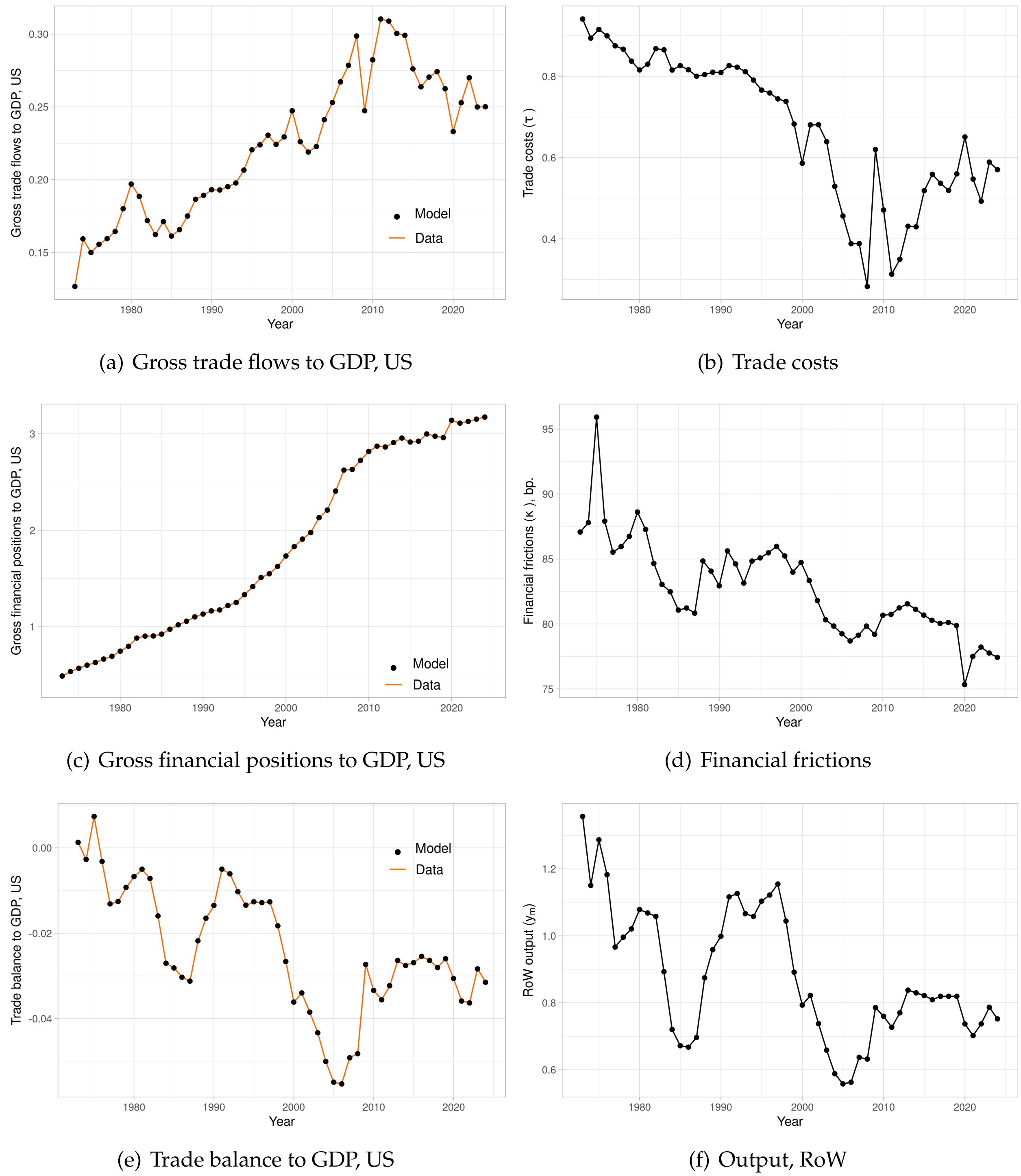
Targeted series The main quantitative analysis recovers three wedges in the model – trade costs, financial frictions, and the relative output (demand) – implied by the target data series, namely gross trade flows, gross financial positions, and net trade balance. It should be emphasized that these series are recovered by solving a long sequence of fixed point problems. Specifically, the *Globalization regime* (ξ) is a hidden state to an econometrician, which governs the trade costs and financial frictions. Therefore, we start from an initial guess of the regime over time as part of the Maximum Likelihood Estimation, and iterate on it until convergence. Moreover, the single endogenous state, net wealth, is solved for each period as a fixed point. Given the previous period's bond positions and using the policy functions and prices, we solve for the net wealth that satisfies equation (24) off the grid points. Finally, in order to exactly match the target time series, we start with an initial guess of three wedges in each period, solve for the net wealth given the wedges, and update based on the differences between target moments until the distances are below the threshold.

Figure 9 plots the three recovered series in the right column and compares the targeted data to the corresponding model-generated series in the left column. While the three wedges jointly match the three data observations each year, each row in the figure connects the target data series with the recovered wedge most highly correlated to it.

The backed out trade costs strongly correlate with the observed gross trade flows (Figures 9(a)-9(b)). Trade flows more than doubled between 1973 and 2008. In tandem, the trade cost variable τ decreased significantly from over 90% to under 30%, resulting in larger imports and exports. In the data, it is noticeable that trade flows decrease strongly in downturns, such as during the early 1980s double-dip recession, the 2001 dotcom bubble, the Great Recession in 2009, and the Covid pandemic in 2020. Not surprisingly, trade costs spike in all of these time periods. Although the US trade volumes recovered after the Great Recession, that event initiated a downward trend. As a result, our measure of trade costs indicates that by 2024 trade barriers had been set back to the early 2000s levels.

International financial barriers are modeled as a wedge in the return offered to foreign and domestic households. The backed out series for financial frictions (Figure 9(d)) is positive, meaning that bondholders receive a lower return on foreign assets or pay a higher interest rate on foreign debt. This disincentives holding assets in the foreign currency and leads to smaller gross positions. The financial frictions variable we uncover decreased from over 95 basis points (bp) in 1975 to 75 bp in 2020, in tandem with the 6-fold increase in the gross financial positions (Figure 9(c)).

However, the correlation between gross positions and financial frictions is not one-to-one. This is because trade costs directly impact the household's incentives to hold a large gross position. As households borrow in the domestic currency and save in the foreign currency, a depreciation of domestic currency improves the financial position of the household. The co-movement between the real exchange rate and output shocks allows households to reduce risk by saving in one currency and borrowing in another. When trade costs decrease, it is cheaper to incur a larger volume of net imports or exports for risk sharing purposes. Consequently, households hold larger gross positions today to hedge their potentially larger net trade volumes tomorrow. As a result, any reduction in trade costs leads to an increase in the gross financial position even if financial frictions



(a) Gross trade flows to GDP, US

(b) Trade costs

(c) Gross financial positions to GDP, US

(d) Financial frictions

(e) Trade balance to GDP, US

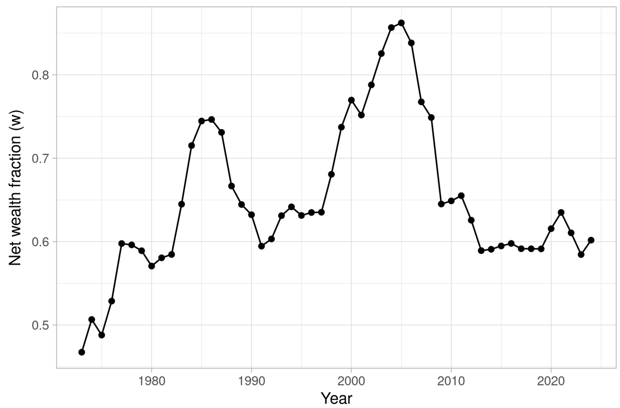
(f) Output, RoW

Figure 9: Targeted series and uncovered shocks

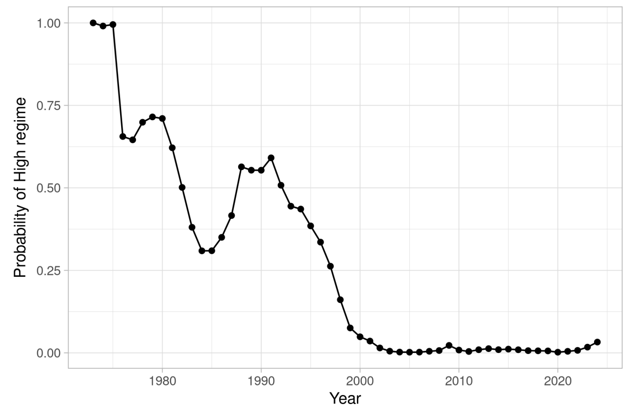
remain unchanged. Therefore, the decline in trade costs during the 1973-2008 period also drives the increase in gross positions. For instance, between 1980 and 1995 the gross position more than doubles but financial frictions decreased only slightly. In other times, the increase in gross positions is driven by a reduction in the financial frictions. This can be observed during the period leading up to the 2008-2009 financial crisis. It is also notable that financial frictions can plunge during a crisis period, as evident in the 2009 Great Recession or the Covid-19 pandemic. This outcome is driven by the combination of an increase in trade barriers and an increase in gross financial positions. As higher trade costs encourage households to unwind their gross position, financial frictions must fall in order to counteract this mechanism. Because trade barriers increased in 2009 sharply, and so did the gross financial positions, the financial frictions must have actually eased. This finding is not as surprising when we consider the host of unconventional policies undertook by governments and central banks around the world in response to these two events. The broad aim of lower interest rates, asset purchases, dollar swap lines and bailouts was to prop up the financial system, and the scale of these operations was particularly stark in 2020. Our model picks it up in the form of a lower κ in both of these episodes, and the largest decline of 5 bp occurs in 2020.

The backed out series for foreign output shocks follows the movement in the US trade balance (Figures 9(f)-9(e)). In our model, a positive shock is an increase in both supply as well as demand. Hence, a positive output shock in RoW increases foreign demand for US goods. As a result, a positive foreign shock increases the US exports relative to the imports, reducing the trade deficit, whereas a negative shock deteriorates the trade balance. Over our sample period, the trade balance of the US has deteriorated significantly, starting at a mild surplus in the early 1970s and reaching a deficit of almost 6% before the Great Recession. In order to match this imbalance in net savings, foreign output tends to be higher between 1973-2000 and lower in the second half of the sample period.

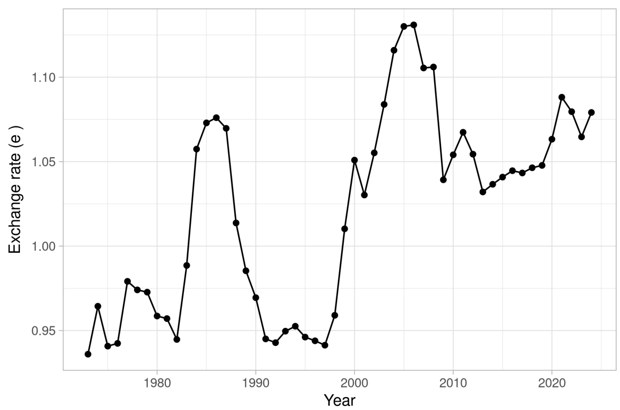
Nontargeted series Figure 10 presents important non-targeted series generated by our model. Panel 10(a) plots net wealth, the single endogenous state variable in the model and the main driver behind most of our results. As consequence of outperforming the RoW output over most of the sample years, the US amassed considerable wealth which peaked in the early 2000s and has been mostly run down since. Figure 10(b) shows the probability of being in the "Fragmentation" (High) regime with high trade and financial frictions. As it is an endogenous object with no direct counterpart in the data, we can only rely on statistical inference about the regime from the behavior of the backed out series for trade and financial frictions. The economy starts in the Fragmentation regime in 1973, but the probability of remaining in it mostly declines over the sample period, with a brief reversal in the 1980s. This pattern follows the dynamics of the backed out financial



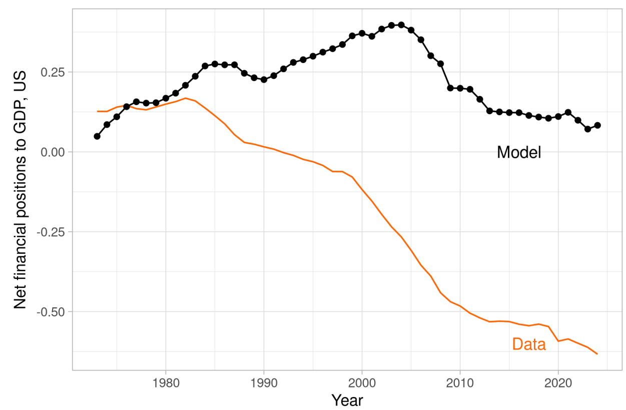
(a) Net wealth



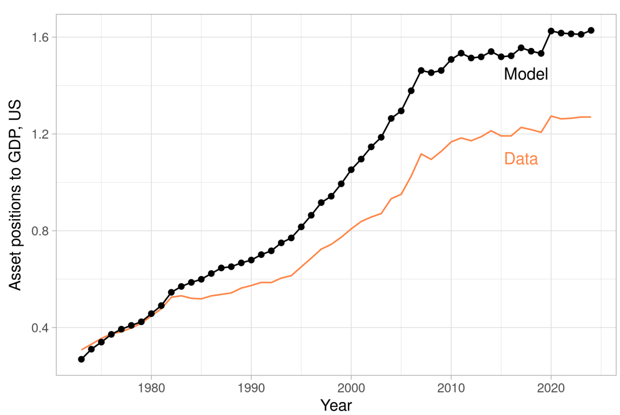
(b) High regime probability



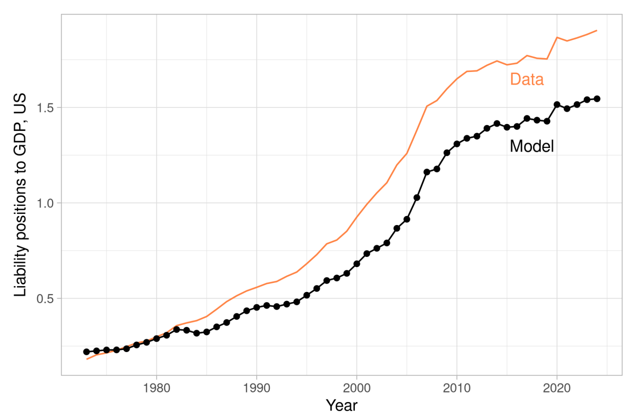
(c) Real exchange rate



(d) Net financial positions



(e) Asset positions to GDP



(f) Liability positions to GDP

Figure 10: Non-targeted series

frictions. As trade costs and financial frictions fall between 1990 and the early 2000s, the economy moves to the "Globalization" regime. Given the sharp increase in trade costs during the Great Recession, the probability of reverting back to the high regime ticks up. Even though trade costs experience an upward trend after 2009, the overall probability of the Globalization regime remains high due to persistently low financial frictions.

The main driver of real exchange rate fluctuations is output shocks. Given that foreign output shocks are strongly correlated with movements in the trade balance, the real exchange rate broadly follows that pattern as well (Figure 10(c)). When the RoW experiences a positive output shock, the price of the foreign good falls as the increase in supply outpaces the increase in domestic demand. The real exchange rate, reflecting the relative price of foreign to domestic goods, appreciates as a result. Hence, the exchange rate is effectively the mirror image of foreign output shocks.

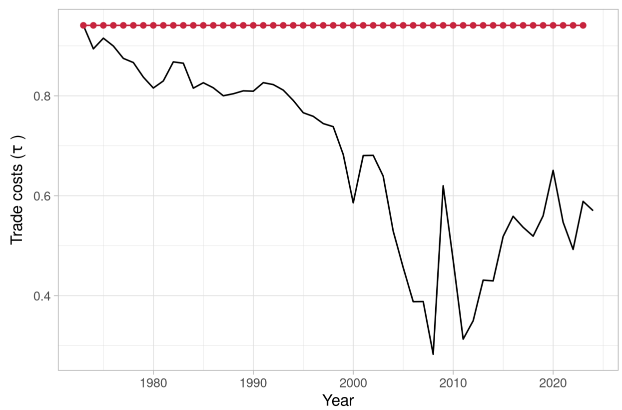
While the model matches the gross financial positions exactly, it does not capture the *net* positions in the data (Figure 10(d)). Specifically, the model policy functions imply higher asset positions and lower liability positions (Figures 10(e)-10(f)). This is understandable considering the fact that the returns on assets and liabilities, which are driven by the exchange rate and bond prices, are not targeted in the model. Specifically, it is well known that returns to some of the US foreign assets have consistently delivered high returns, while the yields on domestic liabilities are much lower. As a result, because we match the *net income from financial assets* exactly (a counterpart of the targeted trade balance), the lack of a realistic spread in the yields results in our model overshooting asset positions and undershooting liability positions. This discrepancy with the data leads to a counterfactual run-up in the net financial positions from 1973 to 2005. Nevertheless, a deterioration in the net financial position emerges in the model since 2005 bringing the non-targeted series closer to the data.

4 Counterfactuals and simulations

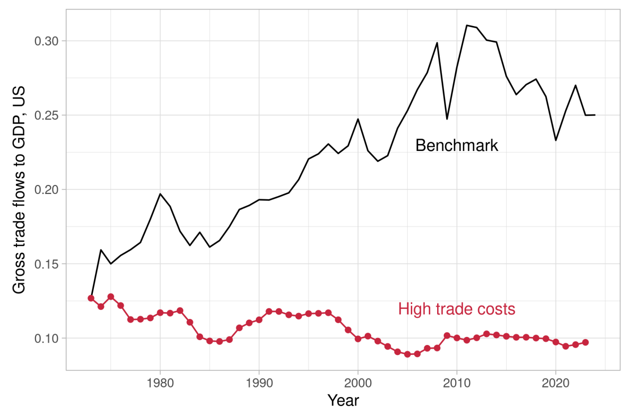
In this section, we use our estimated model to conduct a series of counterfactual experiments. First, we conduct a core set of exercises of shutting down the variation in one of the three wedges at a time. We also consider another interesting scenario where we mimic the tightening of financial frictions at the height of the Great Recession. We then use our model to conduct forward-looking simulated scenarios beyond year 2024, the latest data point in our sample. In particular, we examine the consequences of a trade war-type event or a shift back to the Fragmentation regime.

4.1 No trade globalization

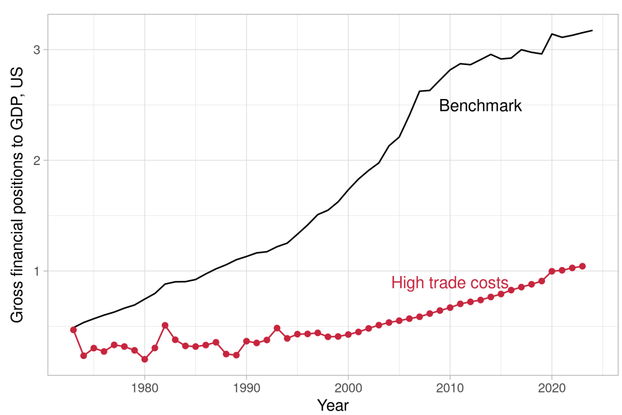
The first counterfactual scenario assumes that the trade cost parameter τ remains fixed throughout the sample period at the level corresponding to 1973, the first year in our exercise. Simultaneously, we let the capital control parameter κ and the endowment realizations (y_b, y_m) follow the originally backed-out series presented in Figure 9.



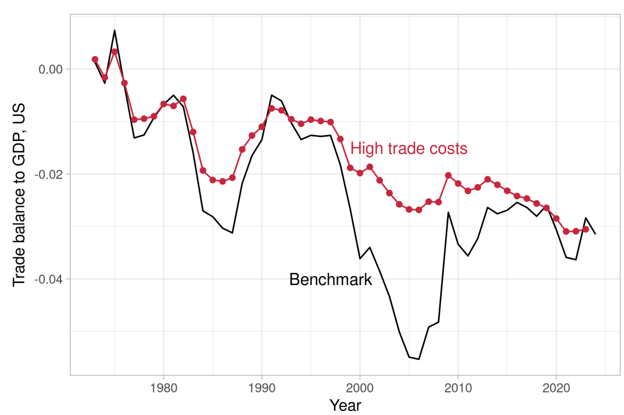
(a) Trade costs



(b) Gross trade flows



(c) Gross financial positions



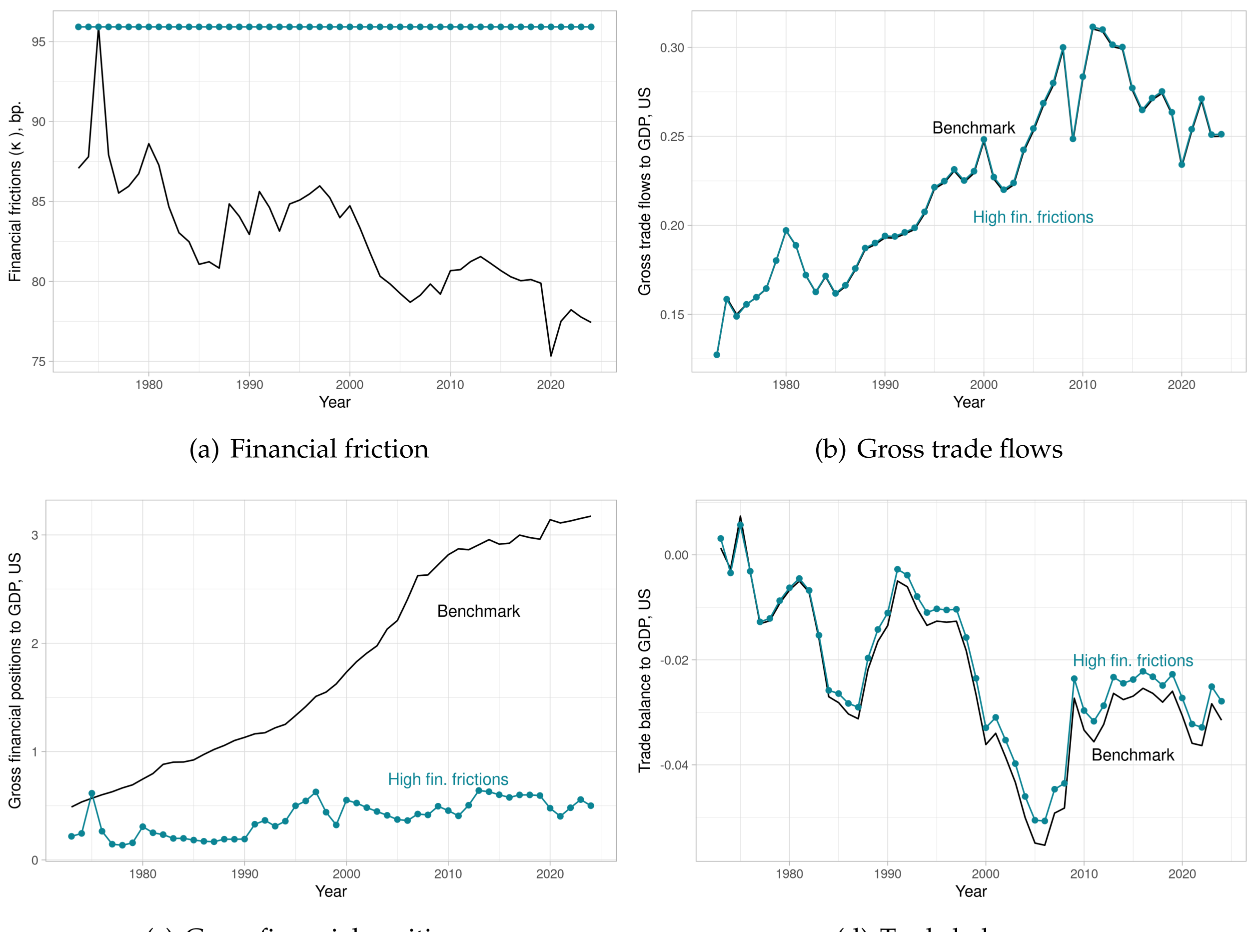
(d) Trade balance

Figure 11: Counterfactual exercises - High trade costs

Figure 11 presents the results of this exercise. As trade costs are kept artificially high (the red-dotted series), gross trade flows stay predictably down and never exceed the equivalent of 15% of GDP. This also causes the gross financial positions to remain low throughout the sample period, although they do start to inch up in the 2000s. Without the ability to trade actual goods, the two countries have also a limited ability to engage in risk sharing. As a result, the financial positions are three times smaller than their empirical counterpart. This result shows that globalization in goods trade is a necessary prerequisite for financial globalization. Finally, suppressing the decline in τ shrinks the US trade deficit especially in the periods where it is the highest, such as 1980s and early 2000s. Nevertheless, after 2010, as gross positions start to increase, the counterfactual trade deficit mostly converges to the data series.

4.2 No financial globalization

In our second counterfactual, we hold the capital control parameter κ fixed at its 1975 level while letting other stochastic variables follow their baseline paths. Figure 12 illustrates the model's predictions in this scenario.



(a) Financial friction

(b) Gross trade flows

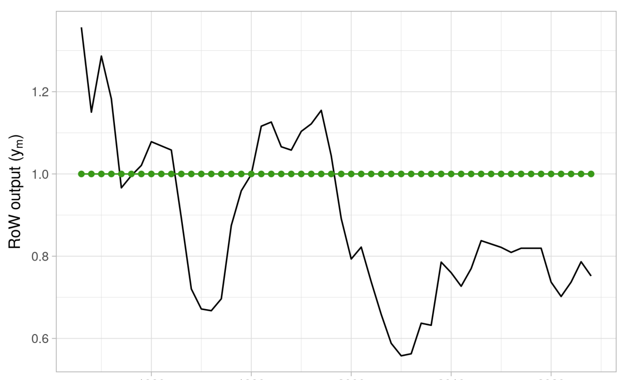
(c) Gross financial positions

(d) Trade balance

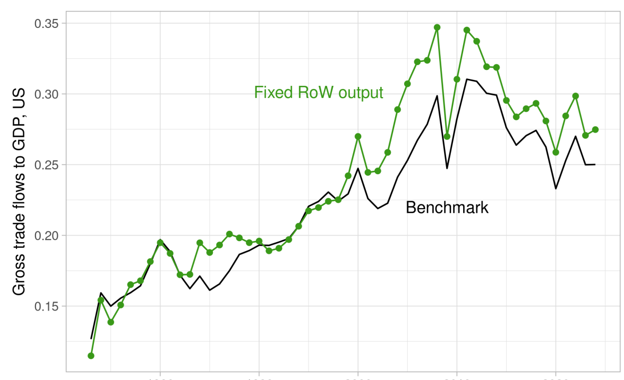
Figure 12: Counterfactual exercises - High financial frictions

As is evident, the lack of financial globalization prevents the rise of gross financial positions (kept at around 50% of GDP), but it has negligible impact on gross trade volumes. It is not the case, however, that trade is entirely unaffected. Instead, high financial frictions lead the US to export more while importing less and these two changes roughly cancel each other out. Panel 12(d) shows that trade deficit is lower in the absence of financial globalization, with the discrepancy first arising in the early 1980s and widening over time. This is related to the fact that high financial frictions prevent the US from accumulating nearly as much net wealth as in reality (Figure 10(a)). Reduced wealth reduces the scope of running persistent trade deficits down the road. As such, we find that financial globalization has much more persistent effects than trade globalization.

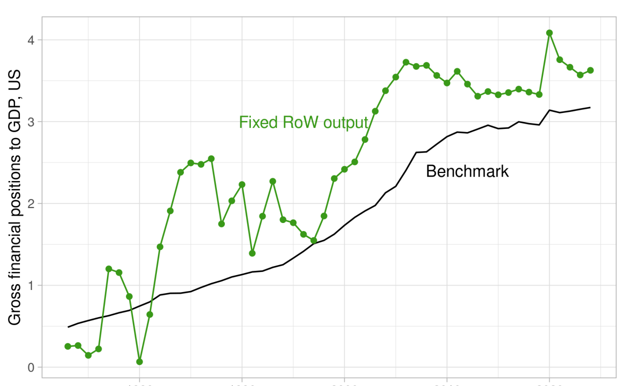
4.3 Globalization with fixed output



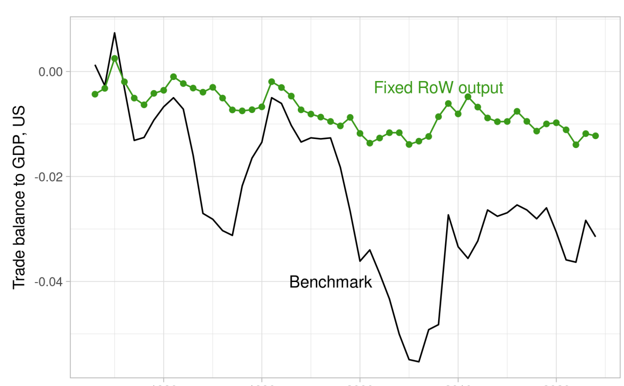
(a) RoW output



(b) Gross trade flows



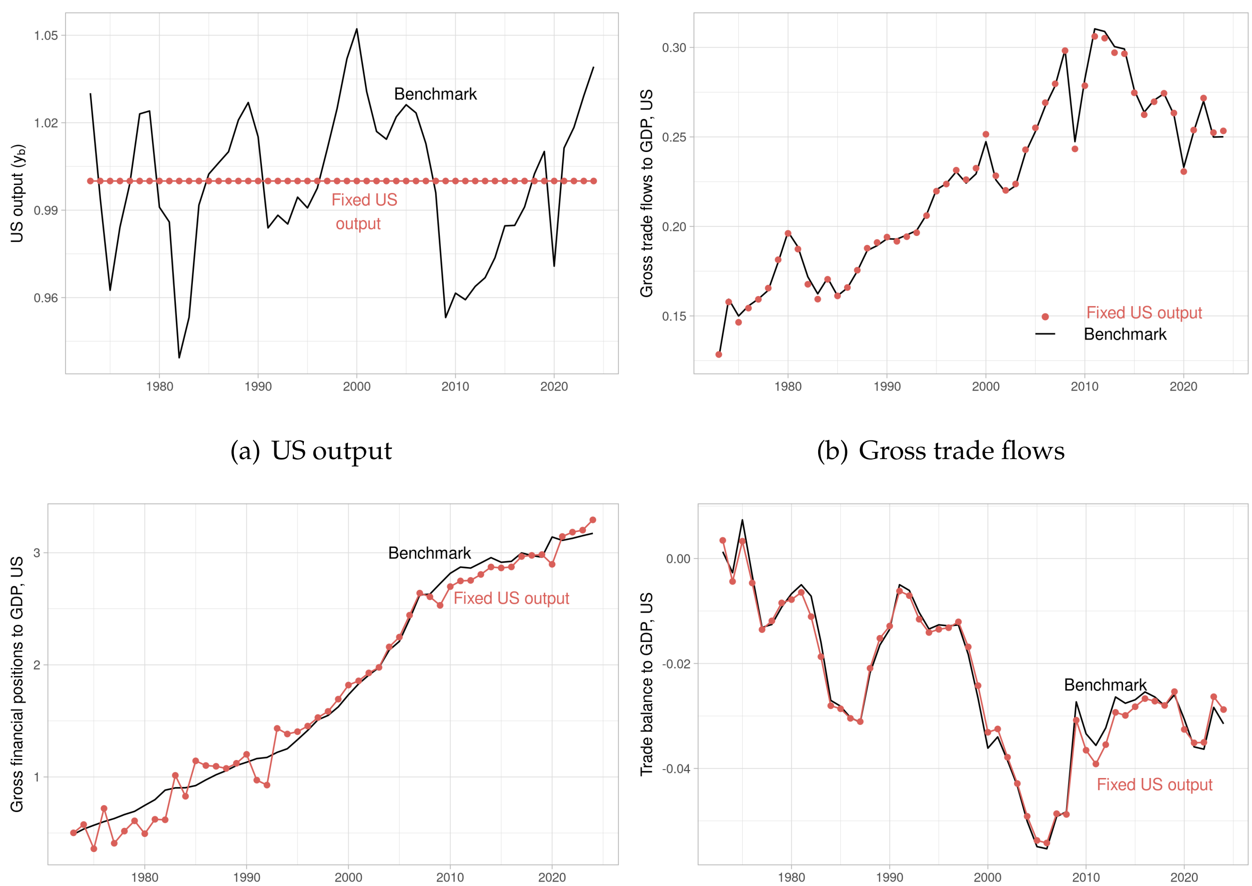
(c) Gross financial positions



(d) Trade balance

Figure 13: Counterfactual exercises - Fixed RoW output

We now turn our attention to the pair of scenarios where the output of each one of the countries is fixed at its mean level, while the remaining stochastic variables (in particular, τ and κ) follow their original paths. Figure 13 presents the model's predictions for the case of fixed RoW output (y_m). Because this wedge exhibits high variance in reality, the counterfactual series deviate significantly from their baseline variants. In particular, after 2000 we do not allow for a steep decline in RoW output which results in higher gross trade flows and higher financial positions, as well as a greatly reduced US trade deficit. This is because high RoW output in our model translates to higher foreign demand for consumption and a larger imports from the US. It is important to keep in mind, however, that the two countries still remain asymmetric in our calibration. Hence, the trade is ultimately not balanced. Other than the change in their levels, however, the endogenous variables in the model mostly maintain their dynamics which is correlated with the paths of trade costs and capital controls.



(a) US output

(b) Gross trade flows

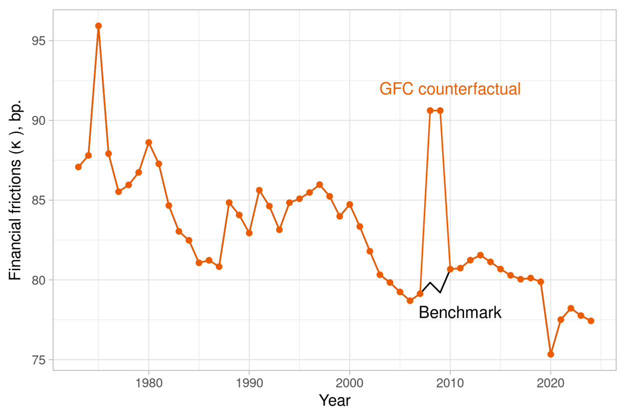
(c) Gross financial positions

(d) Trade balance

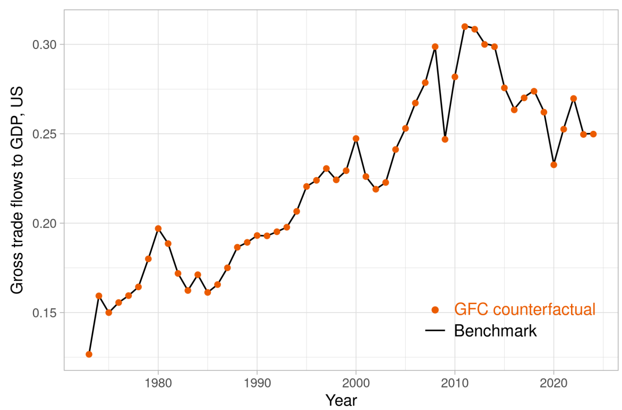
Figure 14: Counterfactual exercises - Fixed US output

Next, we conduct an analogous exercise in which we fix the US output series to its mean value throughout the sample period. The predictions are depicted in Figure 14. Because US output fluctuates much less than the RoW output, the differences between the counterfactual and the baseline series are smaller. Most notably, in the time period around year 2010, when the US output is factually low, fixing it at a higher level results in slightly less trade and lower financial positions, as well as a higher US trade deficit. The intuition is similar to the one for the previous exercise. An artificially high US output goes hand in hand with a taste shock that increases demand for consumption. As a result, US imports more from the RoW.

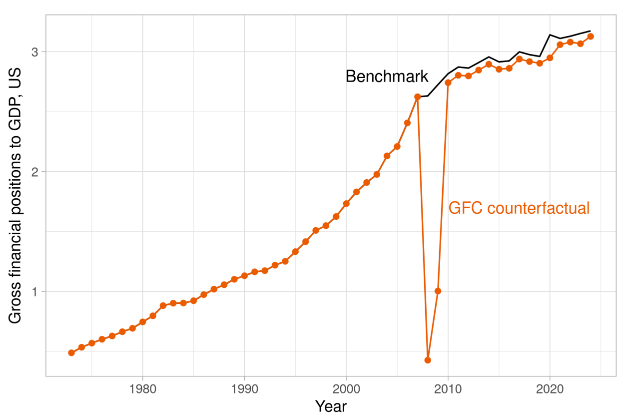
4.4 Financial frictions in the Great Recession



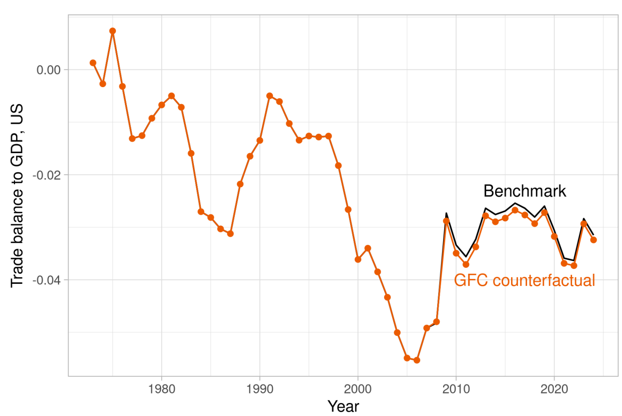
(a) Financial friction



(b) Gross trade flows



(c) Gross financial positions



(d) Trade balance

Figure 15: Counterfactual exercises - Financial frictions hike in 2009

The next exercise is more local in its nature by considering a scenario of a counterfactual reversal of financial integration at the height of the Global Financial Crisis of 2009 where our baseline model picks up a significant spike in the trade cost parameter τ. We assume that the capital control parameter κ follows an analogous spike in years 2008-2009. The result of this exercise is depicted in Figure 15.

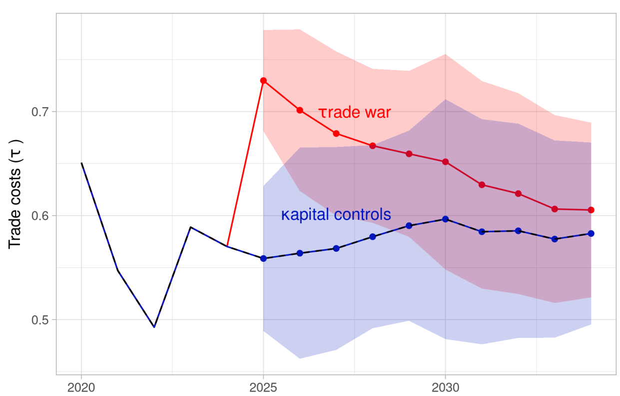
The spike in κ leads to a temporary collapse of the gross financial positions, followed by a rebound. Crucially, the positions never reach the previous level and remain persistently reduced. The gross trade flows are unaffected, but once again the US trade balance is affected in the long run. Specifically, the deficit is widened in this case, which contrasts with our counterfactual in Section 4.2. The key to this result is the concurrent dynamics of net wealth. When we fix κ at a high level in the 1970s, a period of rising US net wealth, the accumulation is inhibited and the country ends up with less wealth to spend down the road in the form of persistent trade deficits. On the other hand, in 2008-2009 the US is already on the path of decumulating its net wealth. As high financial frictions hit, this process is impacted which results in higher net wealth after the Great Recession and higher trade deficits down the road. As such, we find that the financial globalization can have opposing yet long-lasting effects on the trade deficit.

4.5 Effects of Trade War and Capital Controls

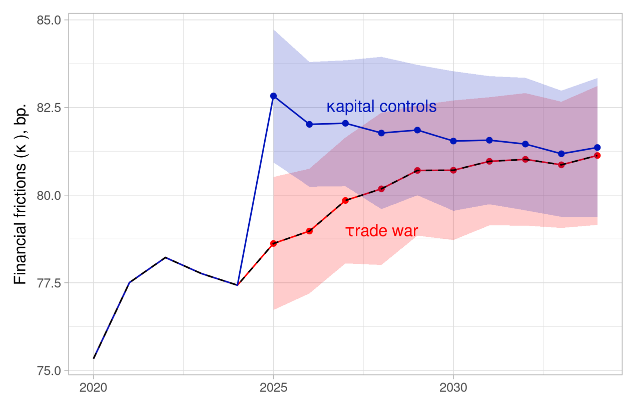
In this set of experiments, we use our framework to consider the various possible outcomes of the trade wars and capital controls under the second Trump administration. President Donald Trump imposed a minimum of 10% tariff on all goods imported into the United States plus "reciprocal tariffs" of varying amounts by countries as part of the "Liberation Day" tariffs on April 2, 2025. Through the lens of our model, this would amount to an upward shock to τ, the trade cost variable. Also, the Trump administration proposed a tax bill in May 2025, "One Big Beautiful Bill", which included a clause allowing additional penalties on foreign persons' US investments by 5 percentage points for four years (Section 899). In our interpretation, this could be modeled as an upward shock to κ, the financial frictions variable. We now consider these two scenarios separately.

Figure 16 describes the setup of our experiments and their direct impact in more detail. In the "τrade war" scenario (labeled in red), we increase τ by two standard deviations in year 2025 (our targeted sample ends in 2024) and then we draw sequences of random numbers to simulate many paths of all the remaining variables (including κ), as well as τ itself starting from the following year. In the "κapital controls" scenario (labeled in blue), we orchestrate an analogous one-time increase in financial frictions κ, while simulating the evolution of all other variables, and of κ itself starting from the following year. We report an average across all simulated paths along with confidence intervals that represent the interquartile range.

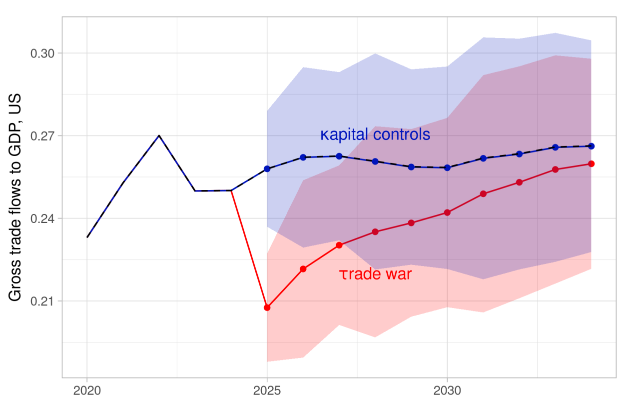
In this setup, both τ and κ follow declining paths in the aftermath of their political shocks because they mean-revert to their respective means within the "globalization" regime. The two scenarios also have predictable direct effects on the endogenous variables in the model. Under the trade war, the volume of trade declines and then recovers but never quite catches up with the capital controls case 10 years after the onset. The gross financial positions suffer significant declines under both trade war and capital controls scenario, with a sharper initial reduction under the latter. Compared to the benchmark simulation (black dashed line) without any trade war or capital controls, gross financial positions



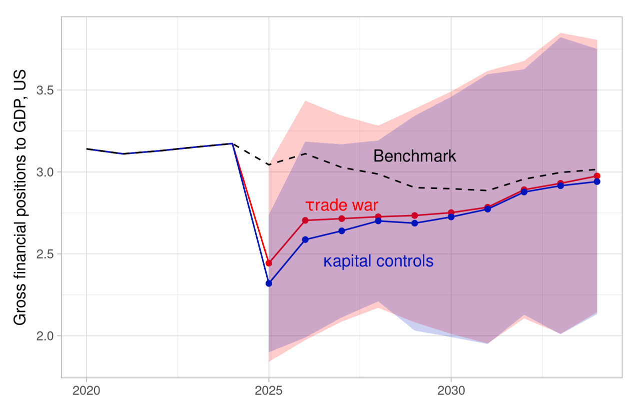
(a) Trade costs



(b) Financial friction



(c) Gross trade flows



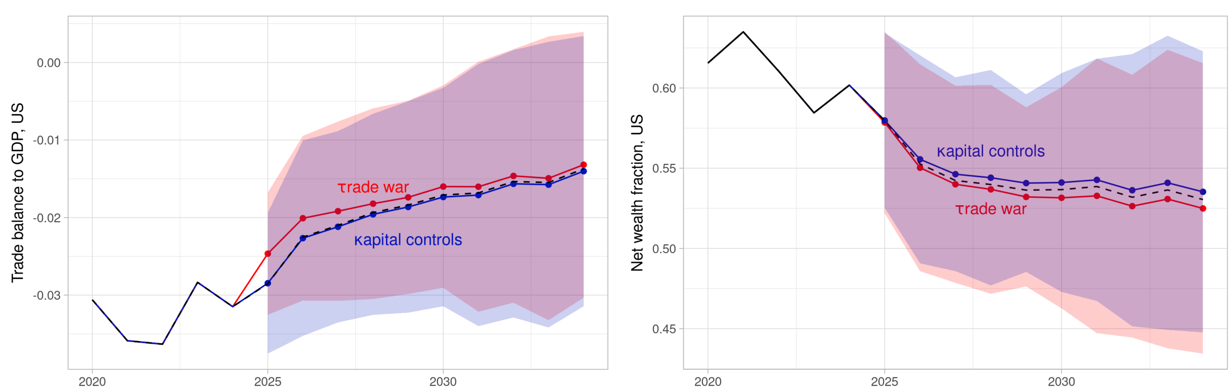
(d) Gross financial positions

Figure 16: Scenarios for trade war/capital controls

remain at a lower level after a decade in both scenarios.

Figure 17(a) plots the simulated paths of the US trade balance under the two scenarios, along with the baseline with no trade or capital market distortion (marked with a black dashed line). In the short run, the trade war scenario reduces the trade deficit by less than half a percentage point compared to the benchmark or the capital controls case. However, in the long run, the effect of tariffs on trade deficit dissipates and all simulated cases converge to a "recovery path" of the trade balance. This is mainly due to the mean reversion in RoW output, which implies a stronger demand for US exports. Compared to the fundamental forces of the RoW output mean reversion, the impact of tariffs or capital controls on trade deficit is small in magnitude.

While the trade war may reduce the trade deficit in the short run, it comes at a cost of reducing the net wealth in the long run. Figure 17(b) shows that compared to the no-distortion benchmark case (black dashed line), trade war brings down the relative net wealth of the US and the gap between the benchmark widens over time. On the other hand, capital controls may have little effect on the trade deficit a decade after its implementation, it distorts the net wealth in the opposite direction compared to tariffs. Therefore, in the longer horizon, capital controls may result in a worsening of the trade deficit as higher relative wealth leads to an increase in net imports.



(a) Trade balance

(b) Net wealth

Figure 17: Simulation for trade war/capital controls: trade balance and net wealth

4.6 Deglobalization scenario

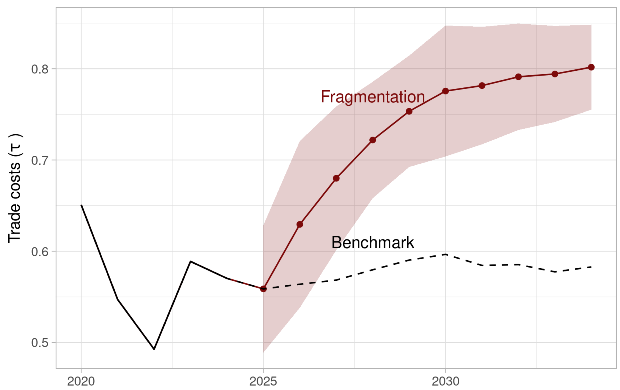
While the experiments described in Section 4.5 concerned a temporary shock to either τ or κ resulting from trade war or capital controls, some economists have wondered whether it is the beginning of a new era of deglobalization. In this experiment, we investigate the consequences of the underlying regime switching from Low (Globalization) to High (Fragmentation). The structure of this exercise is otherwise analogous to the previous one. We generate many simulated paths under the assumption that the regime switches in 2025 and present the averaged series along with their interquartile range, together with the no-regime-switch benchmark simulation for comparison.

Figure 18 presents the result of this experiment. As the regime switches to Fragmentation, both the trade cost and the financial friction series begin a slow upward drift towards their new long-run mean. Along with it, gross trade flows and gross financial positions start declining with the former flattening out at around 19% of GDP. In this exercise, we find that the US trade deficit shrinks further compared to the baseline scenario, but the magnitude is relatively small – the gap between the benchmark case is less than half a percentage point after ten years. As such, we find that neither temporary shocks to trade costs or financial frictions, nor a permanent change of the globalization regime, can dominate the fundamental forces behind the long term evolution of the trade deficit.

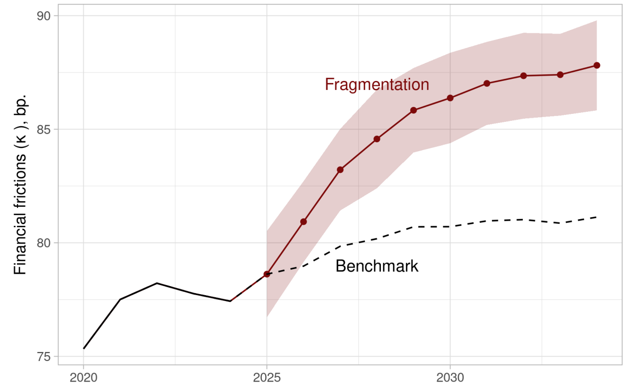
4.7 Deglobalization with trade war or capital controls

As the final set of experiments, we consider scenarios where trade war or capital controls occur at the dawn of deglobalization. In other words, we simulate two scenarios where temporary trade costs (τ) or financial frictions (κ) shocks in Section 4.5 coincide with the beginning of the regime switch from Low (Globalization) to High (Fragmentation) in Section 4.6. The exercises are analogous with the previous two sections, featuring interquartile ranges and benchmark comparisons under each scenario.

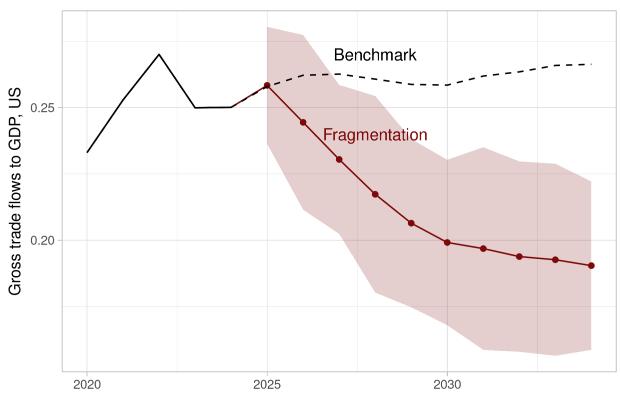
Combining temporary and long run shocks, the results in Figure 19 show the furthest departures from the benchmark simulation case so far. The effects of temporary shocks, either trade war or capital controls, are short-lasting as in the previous Section 4.5. A decade in, what ultimately dominates is the switch to the Fragmentation regime – as trade costs and financial frictions slowly move to higher levels, gross trade flows and financial positions settle to a much lower level over time, similar to the results in Section 4.6. Trade war combined with the Fragmentation regime change brings the trade deficit



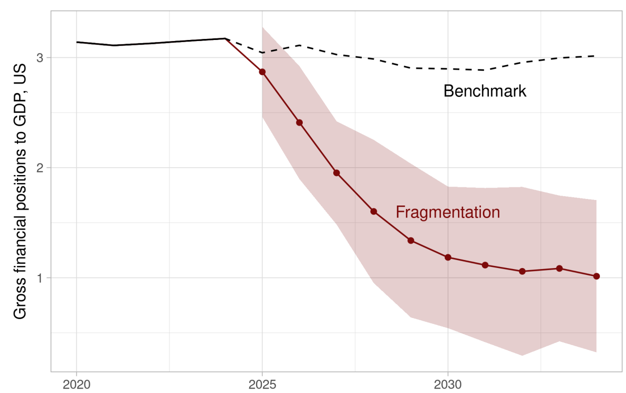
(a) Trade costs



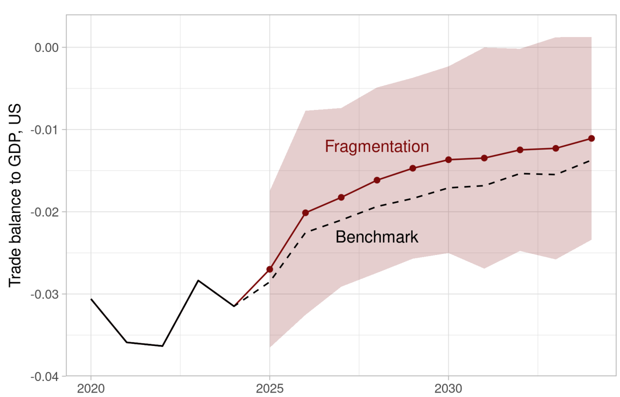
(b) Financial friction



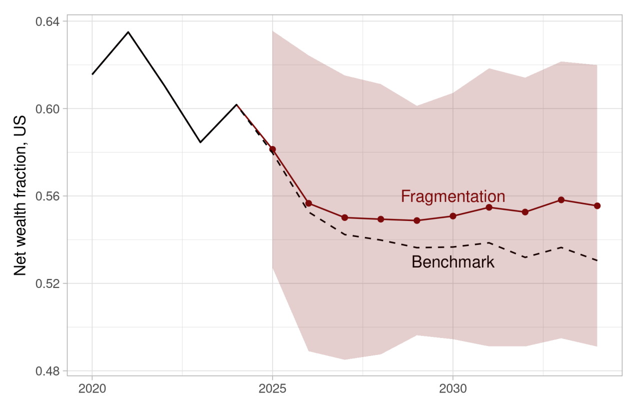
(c) Gross trade flows



(d) Gross financial positions



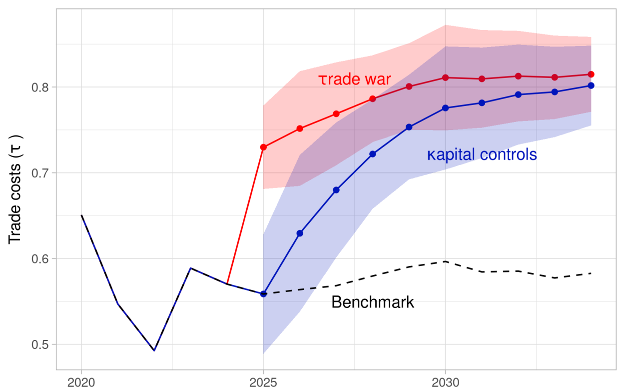
(e) Trade balance



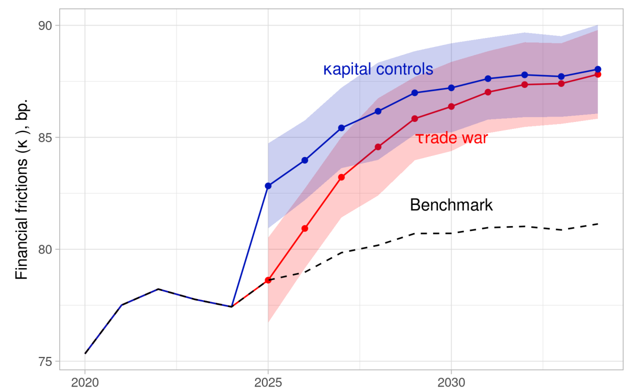
(f) Net wealth

Figure 18: Simulation exercises - Deglobalization scenario

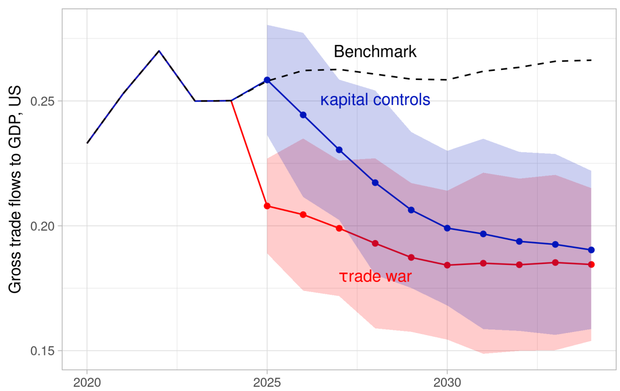
to the smallest level in the short run, but again the distance between the benchmark case is at most half a percentage point. The final exercises confirm that while trade costs and financial frictions have significant and direct impacts on trade and financial positions, their effect on the trade balance is more nuanced compared to the fundamental force of RoW output and demand.



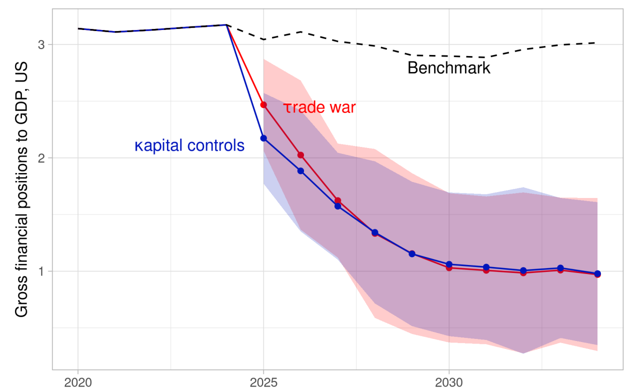
(a) Trade costs



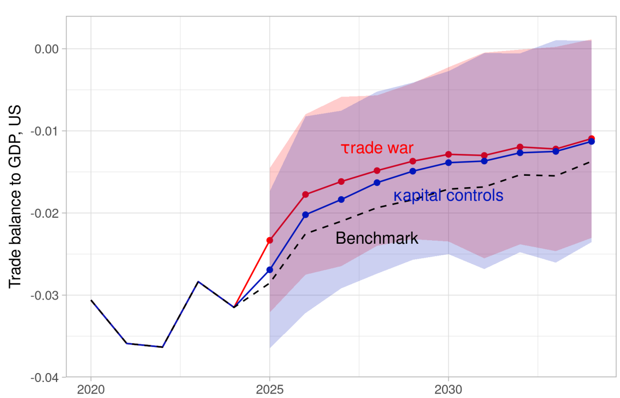
(b) Financial friction



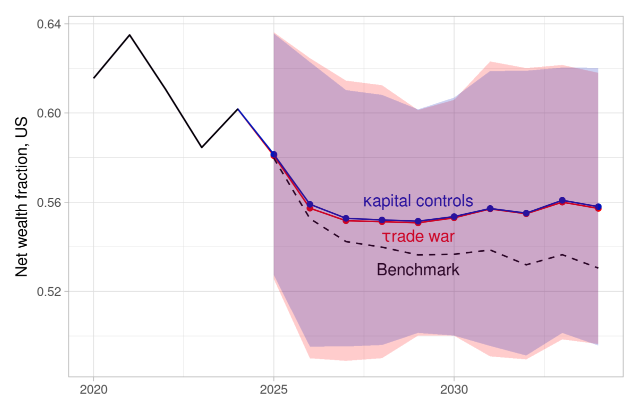
(c) Gross trade flows



(d) Gross financial positions



(e) Trade balance



(f) Net wealth

Figure 19: Simulation exercises - Deglobalization with trade war or capital controls

5 Conclusion

This paper develops a methodology to use the observed volumes of international trade and finance to uncover the drivers of globalization. To do so, we develop a quantitative model in which gross trade and capital flows across countries are explicitly determined. By matching the observed volumes exactly, we are able to find the time series of trade costs and financial frictions that have propelled economic globalization over the past half century. The model calibrated in this way is a potent laboratory to study various counterfactuals as well future policy scenarios.

We find that the decline in trade costs is the primary driver of globalization, a necessary condition for the increase in the volume of both trade and financial flows. Financial integration follows and is necessary predominantly for the rise in the gross capital flows. However, both of these factors are important in shaping the path of the US trade deficit over the past quarter century. A reduction in trade costs increases the trade deficit, while their effects are more short-lived. Financial integration, on the other hand, can increase or decrease the trade deficit and has a longer lasting effect on trade imbalances.

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